CAUVERY COLLEGE FOR WOMEN (AUTONOMOUS)

Nationally Re-Accredited (3rd Cycle) with 'A' Grade (CGPA 3.41 out of 4) by NAAC

TIRUCHIRAPPALLI – 620 018

SYLLABUS FOR

B.Sc., NUTRITION AND DIETETICS

(2020-2021)

B.Sc NUTRITION AND DIETETICS

PROGRAMME EDUCATIONAL OBJECTIVES

PEO 1: The graduates will successfully serve as Dieticians, Food Service Administrators and Project officers in Nutrition and Child care.

PEO 2: The graduates will practice professional ethics and understand socio cultural issues, thereby provide solution for health problems.

PEO 3: The graduates will equip themselves in higher studies and entrepreneurship by applying innovative techniques to suite the recent trends.

PROGRAMME OUTCOMES

PO1: To apply the knowledge of food science, nutrition and dietetics to the scientific issues and problems.

PO 2: To assess the nutritional status and recommend nutritional support and care.

PO 3: To learn physiological, biochemical and microbiological parameters associated with health and diseases.

PO 4: To develop technical and human relation skills in relation to food service management

PO 5: To Demonstrate critical thinking skills and analytical abilities to identify and solve problems in the nutritional sciences.

CAUVERY COLLEGE FOR WOMEN (AUTONOMOUS),TRICHY-18
PROGRAMME STRUCTURE - B.Sc ., NUTRITION ANDDIETETICS
UNDER CHOICE BASED CREDITSYSTEM
(For the candidates admitted from the academic year 2020-2021)

SEM	PART	COURSE	COURSE TITLE	SUBJECT CODE	INS. HRS / WEEK	CREDIT	EXAM HRS	MARKS		TOTAL
								INT	EXT	
I	I	Language Course – I (LC) – Tamil/Other Languages	Ikkala Ilakkiyam	19ULT1	6	3	3	25	75	100
			Story, Novel, Hindi Literature- I & Grammar- I	19ULH1						
			History of Popular Tales Literature and Sanskrit Story	19ULS1						
			Communication in French-I	19ULF1						
	II	English Language Course I (ELC)	Functional Grammar for Effective Communication-I	19UE1	6	3	3	25	75	100
	III	Core Course – I (CC)	Food Science	19UND1CC1	6	5	3	25	75	100
		Core Practical – I (CP)	Food Science-Practical	19UND1CC1P	3	2	3	40	60	100
		First Allied Course – I (AC)	Food Microbiology	19UND1AC1	4	4	3	25	75	100
		First Allied Course - II Practical (AP)	Food Microbiology and Food Chemistry –Practical	19UND1AC1P	3	-	-	-	-	-
	IV	UGC Jeevan Kaushal Life Skills	Universal Human Values	20UGVE	2	2	3	25	75	100
			TOTAL		**30**	**19**				**600**

II	I	Language Course – II (LC) – Tamil/Other Languages	Idaikala ilakkiyamum pudhinamum	19ULT2	6	3	3	25	75	100
			Prose, Dramma, Hindi Literature-2 & Grammar-II	19ULH2						
			Poetry Textual Grammar and Alakara	19ULS2						
			Communication in French-II	19ULF2						
	II	English Language Course II (ELC)	Functional Grammar for Effective Communication-II	19UE2	6	3	3	25	75	100
	III	Core Course – II (CC)	Human Physiology	19UND2CC2	6	6	3	25	75	100
		Core Practical – II (CP)	Human Physiology – Practical	19UND2CC2P	3	2	3	40	60	100
		First Allied Course – II Practical (AP)	Food Microbiology and Food Chemistry –Practical	19UND1AC1P	3	3	3	40	60	100
		First Allied Course – III (AC)	Food Chemistry	19UND2AC2	4	2	3	25	75	100
	IV	Environmental Studies	Environmental studies	19UGES	2	2	3	25	75	100
	V	Extra Credit Course	SWAYAM ONLINE COURSE	To be Fixed Later	As per UGC Recommendation					
			TOTAL		**30**	**21**				**700**

III	I	Language Course – III (LC) – Tamil/Other Languages	Kappiyamum Nadagamum	19ULT3	6	3	3	25	75	100
			Medieval, Modern Poetry & History of Hindi Literature 3	19ULH3						
			Prose, Textual Grammar and Vakyarachana	19ULS3						
			Communication in French - III	19ULF3						
	II	English Language Course III (ELC)	Reading and Writing for Effective Communication -I	19UE3	6	3	3	25	75	100
	III	Core Course – III (CC)	Principles of Nutrition	19UND3CC3	6	5	3	25	75	100
		Core Practical – III (CP)	Principles of Nutrition – Practical	19UND3CC3P	3	2	3	40	60	100
		Second Allied Course – I(AC)	Nutritional Biochemistry	19UND3AC3	4	4	3	25	75	100
		Second Allied Course – II Practical (AP)	Nutritional Biochemistry & Clinical Biochemistry – Practical	19UND3AC2P	3	-	-	-	-	-
	IV	Non Major Elective I – for those who studied tamil under Part-I	Basics in Nutrition	19UND3NME1	2	2	3	25	75	100
		a. Basic Tamil for other language students	Basic Tamil	19ULC3BT1						
		b. Special Tamil forthose who studied Tamilupto +2 but opt for other languages in degree Programme	Special Tamil	19ULC3ST1						
	V	Extra Credit Course	SWAYAM ONLINE COURSE	To be Fixed Later	As per UGC Recommendation					
			TOTAL		**30**	**19**				**600**

IV	I	Language Course – IV (LC) – Tamil/Other Languages	Pandaiya Ilakkiyam	19ULT4	6	3	3	25	75	100
			Letter writing, Precise Writing, General Essays, Technical Terms, Proverbs, Amplifications, Idioms & Phrases, History of Hindi Literature -4	19ULH4						
			Drama, History of Drama Literature	19ULS4						
			Communication in French -IV	19ULF4						
	II	English Language Course IV (ELC)	Reading and Writing for Effective Communication -II	19UE4	6	3	3	25	75	100
	III	Core Course – IV (CC)	Nutrition through Life Cycle	19UND4CC4	5	5	3	25	75	100
		Core Practical – IV (CP)	Nutrition through Life Cycle – Practical	19UND4CC4P	3	2	3	40	60	100
		Second Allied Course – II Practical (AP)	Nutritional Biochemistry & Clinical Biochemistry – Practical	19UND3AC2P	3	3	3	40	60	100
		Second Allied Course - III (AC)	Clinical Biochemistry	19UND4AC4	3	2	3	25	75	100
	IV	Non Major Elective II – for those who studied tamil under Part-I	Nutrition for the Family	19UND4NME2	2	2	3	25	75	100
		a. Basic Tamil for other language students	Basic Tamil	19ULC4BT2						
		b. Special Tamil for those who studied Tamil upto +2 but opt for other languages in degree programme	Special Tamil	19ULC4ST2						
		Skill Based Elective – I	I.A.Regional Cuisines	19UND4SBE1A	2	2	3	25	75	100
			I.B.Basics in Food Production	19UND4SBE1B						
	V	Extra Credit Course	SWAYAM ONLINE COURSE	To be Fixed Later	As per UGC Recommendation					
			TOTAL		**30**	**22**				**800**

V	III	Core Course – V (CC)	Diet Therapy I	19UND5CC5	5	5	3	25	75	100
		Core Course – VI (CC)	Dietary Food Service Management	19UND5CC6	5	5	3	25	75	100
		Core Course – VII (CC)	Dietary Internship	19UND5CC7	5	5	-	40	60	100
		Core Practical - V (CP)	Diet Therapy I – Practical	19UND5CC5P	4	3	3	40	60	100
		Major Based Elective – I	I.A. Food Standards and Quality Control	19UND5MBE1A	5	5	3	25	75	100
			I.B. Techniques of Food Evaluation	19UND5MBE1B						
	IV	Skill Based Elective – II	II.A. Bakery and Confectionary - Practical	19UND5SBE2AP	2	2	3	40	60	100
			II.B. Computer Applications in Nutrition and Dietetics - Practical	19UND5SBE2BP						
		Skill Based Elective – III	III.A. Food Preservation - Practical	19UND5SBE3AP	2	2	3	40	60	100
			III.B. Food Product Development - Practical	19UND5SBE3BP						
		UGC Jeevan Kaushal Life Skills	Professional Skills	19UGPS	2	2	3	25	75	100
	V	Extra Credit Course	SWAYAM ONLINE COURSE	To be Fixed Later	As per UGC Recommendation					
			TOTAL		**30**	**29**				**800**

VI		Core Course – VIII (CC)	Diet Therapy II	19UND6CC8	6	6	3	25	75	100
		Core Course – IX (CC)	Perspectives of Home Science	19UND6CC9	6	6	3	25	75	100
		Core Practical– VI (CP)	Diet Therapy II - Practical	19UND6CC6P	5	4	3	40	60	100
	III	Major Based Elective – II	II.A. Community Nutrition	19UND6MBE2A	6	6	3	25	75	100
			II.B. Principles of Resource Management	19UND6MBE2B						
		Major Based Elective – III	III.A. Food Processing	19UND6MBE3A	6	6	3	25	75	100
			III.B. Nutraceuticals and Functional Foods	19UND6MBE3B						
	V	Extension Activities	Extension Activities	19UGEA	-	1	-	-	-	-
		Gender Studies	Gender Studies	19UGGS	1	1	3	25	75	100
			TOTAL		**30**	**30**				**600**
			GRAND TOTAL		**180**	**140**				**4100**

SEMESTER – I	FOOD SCIENCE	HOURS / WEEK – 6	
CORE COURSE - I		CREDIT – 5	
COURSE CODE – 19UND1CC1		INTERNAL 25	EXTERNAL 75

Objectives

- To obtain knowledge on different food groups, their composition and their role in diet.
- To study the different methods of cooking.

Course outcomes

On the successful completion of the course, students will be able to:

CO Number	CO Statement	Knowledge Level
CO1.	Define food and list the different cooking methods	K1
CO2.	Explain the structure, composition and by-products of cereals and pulses	K2
CO3.	Illustrate the chemical reactions that occur during ripening, cooking and storage of fruits	K2
CO4.	Classify and explain the composition of milk and meat products and techniques adopted for cooking	K3
CO5.	Predict the role of fats and oils, sugar, spices and condiments in cookery.	K3

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1.	S	M	M	M	S
CO2.	S	M	M	M	S
CO3.	S	M	M	M	S
CO4.	S	M	M	M	S
CO5.	S	M	M	M	S

S- Strong; M-Medium;

Syllabus

UNIT I **(16Hours)**

a. **Introduction to Food Science:** Definition of Food Science, Basic Five Food Groups, Food Pyramid.
b. **Nutritional classification of foods** – Energy yielding, body building and protective and regulatory foods.
c. **Cooking methods:** Objectives, different types cooking methods- moist, dry heat methods, microwave cooking, combination of cooking methods and solar cooking method - merits and demerits.

UNIT II **(20Hours)**

a. CerealsandCerealproducts: Structure,composition,nutritivevalueandmillingofwheat, parboiling of rice, by-products of cereals, malting of cereals, nutritional importance of millets - (maize, jowar, ragi, bajra), storage and infestation, role of cereals in cookery.
b. Pulses: Composition and nutritive value, factors affecting cooking quality of pulses, processing of pulses, germination and fermentation – process, advantages and disadvantages, toxic constituents–trypsininhibitors,lathyrogens,favism,haemagglutinins, cyanogenic glycoside, saponins, goitrogens, tannins, role of pulses in cookery.
c. Nuts and Oilseeds: Composition**,** Nutritive value, Role of Nuts and oilseeds in cookery

UNIT III **(14Hours)**

a. **Fruits:** Classification, nutritive value, changes during ripening of fruits, selection of fruits, enzymatic browning and methods of prevention, storage techniques.
b. **Vegetables:** Classification and nutritive value, pigments- fat-soluble, water-soluble, selection of vegetables, cooking of vegetables-changes during cooking, nutrient loss, effect of cooking on the pigments.

UNIT IV **(22Hours)**

a. **Milk and Milk Products:** Composition and nutritive value, processing of milk, types of milk products-whey protein concentrate, skim milk, evaporated milk, dry milk, filled milk, flavoured milk, toned and double toned milk, ice-cream, khoa, curd, cream and cheese, role of milk in cookery.
b. **Egg:** Structure, composition and nutritive value, evaluation of quality of egg, role of egg in cookery.
c. **Meat:** Structure, composition, types of meat, cuts of meat, ageing and curing of meat, post mortem changes in meat, and tenderness of meat, meat cookery.
d. **Poultry:** Composition, classification and nutritive value, poultry cookery.
e. **Fish:** Structure, composition, nutritive value, selection of fish, fish cookery.

UNIT V **(18Hours)**

a. **Fats and oils:** Composition, processing and refining of fats and oils, rancidity, plasticity, hydrogenation, winterization, smoking point, factors affecting smoking point, fat substitutes, absorption of fat during cooking, role of fat or oil in cookery.
b. **Sugar:** Nutritive value, sugar related products, stages of sugar cookery, crystallization, factors affecting crystallization.
c. **Spices and condiments:** #Types and uses in Indian cookery, medicinal properties#

#-# : Self Study

Textbooks

S.No.	Author name	Year of publication	Title of the book	Publishers name
1.	Shakuntala Manay N	2001	Foods: facts and principles	New Age International Publishers, New Delhi
2.	Potter, Norman N	2007	Food Science	CBS Publications and distributors, New Delhi
3.	Srilakshmi B	2016	Food Science	New Age International Publishers, New Delhi

Reference books

S.No.	Author name	Year of Publication	Title of the book	Publishers name
1.	Raheena Begum M	2008	Textbook of Foods, Nutrition and Dietetics	Sterling Publishers Pvt. Ltd., New Delhi
2.	Sharma Jyoti S	2009	Applied Nutrition and Food Science	Akansha Publishing House, New Delhi(2009).
3.	Vickie A.Vaclavik, Elizabeth W.Christian	2014	Essentials of Food Science	Springer Science and Business Media, New York
4..	Avantina Sharma	2017	Textbook of Food Science and Technology	CBS Publishers and Distributors

Journals:

- Food Science and Nutrition, John Wiley and Sons Ltd publisher, UnitedKingdom.
- Food and Nutrition Research, Co-Action Publishing, Sweden.
- Journal of Food Science Education, Institute of Food Technologists publishing, United States.
- Journal of the Science of Food and Agriculture, Wiley-Blackwell publishing,England.

Web links:

https://study.com/academy/lesson/what-is-food-science-definition-

research.htmlhttps://www.nia.nih.gov/health/important-nutrients-know-proteins-

carbohydrates-and-fats

Pedagogy: E-content, Lecture, Power point presentation, Seminar, Assignment, Industrial visit

Course Designers

- Ms.S.Preethi
- Ms.E.Agalya

SEMESTER – I	FOOD SCIENCE - PRACTICAL	HOURS / WEEK – 3	
CORE PRACTICAL - I		CREDIT – 2	
COURSE CODE – 19UND1CC1P		INTERNAL 40	EXTERNAL 60

Objectives

- To gain knowledge in food groups and methods of cooking.
- To classify recipes based on different cooking techniques adopted.

Course Outcomes

On the successful completion of the course, students will be able to:

CO Number	CO Statement	Knowledge Level
CO1.	Identify various food groups.	K1
CO2.	Illustrate weighing and measuring of raw food items	K2
CO3.	Describe the different cooking techniques.	K2
CO4.	Prepare recipes from five food groups	K3
CO5.	Predict role of food groups in cookery	K3

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1.	S	M	M	M	S
CO2.	S	M	M	M	S
CO3.	S	M	M	M	S
CO4.	S	M	M	M	S
CO5.	S	M	M	M	S

S- Strong; M-Medium

Syllabus

- Weighing and measuring of raw food items
- **Cereals:** Preparation: Idli, Chapathi, Poori, Ragi upma, Kozhukattai, Aloo paratha, Rice. Millet based recipes –Sathumavu mix, Millet ball, Millet pongal, Millet payasam
- **Pulses:** Preparation: Sundal, Bholi, Green gram payasam, Dhal makhani, Vadai, Sambar and Sprouts salad.
- **Fruits:** Preparation: Fritters, Halwa, Salad, Milkshakes and Freshjuices.
- **Vegetables:** Preparation: Avial, Stewed potato curry, Koottu, Poriyal, Vegetable Salad, and Vegetable soup.
- **Milk:** Preparation: Cottage Cheese, Paneer, Phirnee, Payasam, Ice cream and Basanthi.
- **Meat:** Preparation: Deep fried Chicken, Mutton gravy.
- **Fish:** Preparation: Steamed fish, Fish fry.
- **Egg:** Preparation: Boiled, Scrambled and Poached egg, Curry and Omelette.

Text Books

S.No	Author name	Year of publication	Title of the book	Publishers name
1.	Shakuntala Manay N	2001	Foods: facts and principles	New Age International Publishers, NewDelhi
2.	Potter, Norman N	2007	Food Science	CBS Publications and distributors, New Delhi

Reference Books

S.No	Author name	Year of publication	Title of the book	Publishers name
1.	Raheena Begum M	2008	Textbook of Foods, Nutrition and Dietetics	Sterling Publishers Pvt. Ltd., NewDelhi
2.	Sumathi R Mudambi and M.V.Rajagopal	2004	Fundamentals of Foods and Nutrition	New Age International Publishers, New Delhi
3.	Avantina Sharma	2017	Textbook of Food Science and Technology	CBS Publishers and Distributors

Pedagogy: E-content, Lecture, Power point presentation, Seminar, Assignment, Demonstration

Course Designers

- Ms.S.Preethi
- Ms.E.Agalya

SEMESTER – I	FOOD MICROBIOLOGY	HOURS / WEEK – 4	
FIRST ALLIED COURSE - I		CREDIT – 4	
COURSE CODE – 19UND1AC1		INTERNAL 25	EXTERNAL 75

Objectives

- To acquire knowledge in relevance to microbiology and its applications in everyday life
- To understand the role of microorganisms in food industry and their beneficial effects.

Course outcomes

On the successful completion of the course, students will be able to:

CO Number	CO Statement	Knowledge Level
CO1.	List and identify the sources of microorganisms.	K1
CO2.	Describe the factors affecting the growth of microorganisms.	K2
CO3.	Illustrate role of microorganisms in the spoilage of perishable foods.	K2
CO4.	Explain role of microorganisms in the spoilage of non perishable foods.	K2
CO5.	Apply the beneficial effects of microorganisms in food processing industries.	K3

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1.	M	M	S	S	S
CO2.	M	M	S	S	S
CO3.	M	M	S	S	S
CO4.	M	M	S	S	S
CO5.	M	M	S	S	M

S- Strong; M-Medium

Syllabus

UNIT I **(12Hours)**

a. Microbiology

Definition, History, Microscope – Types and uses, classification of microorganisms – prokaryotes and eukaryotes.

b. Morphology of microorganisms

#Bacteria#, Virus, Fungi- Moulds and Yeasts, Protozoa and algae.

UNIT II **(12Hours)**

a. Growth and multiplication

Growth curve, batch culture and continuous culture, chemostat and turbidostat.

b. Factors affecting growth

Intrinsic factors - nutrient content, pH, Redox potential, antimicrobial barrier and water activity. Extrinsic factors - relative humidity, temperature and gaseous atmosphere.

UNIT III **(12Hours)**

a. Microbiology of perishable foods

Contamination, spoilage and preservation of vegetables and fruits, milk and milk products, meat and meat products, egg, poultry, baked products and canned foods.

b. Microbiology of Non perishable foods

Contamination, spoilage and preservation of cereal and cereal products, pulses and legumes, sugar and sugar products.

UNIT IV **(12Hours)**

a. Microbiology of water:

Sources, bacteriological examinations, total count, test for E-coli and purification of water, Modern methods of purification - Reverse Osmosis, Ultraviolet purification, role of activated carbon.

b. Control of Microorganisms:

Temperature – high, low, Sterilization, Irradiation. Chemical agents – Disinfectant,benzoates,sorbates,propionates,acetates,nitratesandnitrites,sulphurdioxide and sulphites and antibiotics, Pickling, addition of sugar or salt, fermentation,drying

UNIT V **(12Hours)**

a. **Beneficial effects of microorganisms**

Role of micro organisms in fermented foods - curd, probiotics, cheese, sauerkraut, meat, and soy based foods and alcoholic beverages, factors controlling fermentation in foods.

b. **Hazards of microorganisms**

Food poisoning, food borne diseases – Salmonellosis, Botulism, Poliomyelitis, Hepatitis, Amoebic dysentery.

- #: Self study

Text Books

S.No.	Author name	Year of Publication	Title of the book	Publishers name
1.	Frazier William C	2012	Food Microbiology	Mcgraw Hill Irwin Companies, New York
2.	Adams, M R	2014	Food Microbiology	New Age International Publishers, New Delhi
3.	PelczarJr, Michael J	2014	Microbiology	Mcgraw Hill Education (India) Private Ltd, NewDelhi

Reference Books

S.No	Author name	Year of publication	Title of the book	Publishers name
1.	SugandharBabu R P	2008	Food Microbiology	Adhyayan Publishers anddistributors,Newdelhi
2.	Vijaya Ramesh K	2009	Food Microbiology	New Age International Publishers, NewDelhi
3.	BohraandParihar	2012	Food Microbiology	Student edition
4.	Anathanaraya	2013	Textbook of Microbiology	University Press(India) Pvt. Ltd, Hyderabad

Journals :

- Indian Journal of Microbiology Research, IP Innovative Publication Private Limited, NewDelhi
- Journal of Basic Microbiology, Wiley-Blackwell,Germany
- Journal of Microbiology, Microbiological Society Korea, SouthKorea

Web Links

http://airccse.org/journal/ijscai/papers/3214ijscai01.pdfhttps://www.ncbi.nlm.nih.gov/books/NBK216688/https://www.fda.gov/files/food/published/Evaluation-and-Definition-of-Potentially-Hazardous-Foods.pdfhttps://nptel.ac.in/courses/102103015/pdf/mod5.pdf

Pedagogy: E-content, Lecture, Power point presentation, Seminar, Assignment

Course Designers

- Ms.S.Agalya
- Ms.J.Sudharshini

SEMESTER I & II	FOOD MICROBIOLOGY & FOOD CHEMISTRY – PRACTICAL	HOURS / WEEK – 3	
FIRST ALLIED COURSE -II PRACTICAL		CREDIT – 3	
COURSE CODE – 19UND1AC1P		INTERNAL 40	EXTERNAL 60

Objectives

- To acquire knowledge on cultivation of microorganisms.
- To understand the chemical changes in food.

Course outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1.	Identify the instruments and match their application in Microbiological laboratory.	K1
CO2.	Describe the pure culture and staining techniques.	K2
CO3.	Illustrate the microbiological analysis of water.	K2
CO4.	Explain the chemistry of various nutrients present in food.	K2
CO5.	Predict the physical and chemical changes that take place during cooking.	K3

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1.	S	M	S	M	S
CO2.	S	M	S	M	S
CO3.	S	M	S	M	S
CO4.	S	S	M	M	S
CO5.	S	S	M	M	S

S- Strong; M-Medium

Syllabus

FOOD MICROBIOLOGY

- Instrumentationinmicrobiologylaboratoryandtheirfunction(microscope,autoclave,hotair oven).
- Preparation of culture media.
- Pure culture techniques (spread plate, streak plate and pour plate methods).
- Staining techniques (simple and differential)
- Microbiological analysis of water.
- Isolation of spoilage organisms from different food commodities.

FOOD CHEMISTRY

- **Chemistry of Starches:** Gelatinization properties of food starches, microscopic examination of uncooked and gelatinized starch.
- **Chemistry of Sugars:** Stages of sugar cookery, sugar crystallization in preparation of fondant, fudge, and caramel
- **Chemistry of Proteins:** Gluten formation. Soaking, germination and malting of pulses, coagulation of egg white and egg yolk (Boiled Egg, Poached Egg, Omelet), coagulation and precipitation of milk, preparation techniques on meat tenderization using curd, papaya and ginger garlic paste.
- **Chemistry of Fats and Oils:** Determination of smoking temperature of different fats and oils, factors affecting absorption of fat in deep fat frying of foods.
- **ChemistryofPlantPigments:**Effectofacids,alkaliandheatonwater-solubleandfat-soluble pigments, enzymatic browning in apples, banana, brinjal and raw banana and preventive measures

Text Books

S.No.	Author name	Year of publication	Title of the book	Publishers name
1.	Iqbal, Syed Aftab	2011	Advanced Food Chemistry,	Discovery Publishing House, New Delhi
2.	Chopra H,K and Panesar P,S	2015	Food Chemistry	Narosa Publishing House (P) Ltd, New Delhi

Reference Books

S.No	Author name	Year of publication	Title of the book	Publishers name
1.	A.S.Rao	2001	Introduction to Microbiology	Prentice-Hall of India Private Ltd, NewDelhi
2.	BhartiArora, D.R.Arora	2007	Practical Microbiology	CBS Publishers &Distributors, NewDelhi
3.	Satarkar, Archana	2008	Food Science and Nutrition	ABD Publishers, Jaipur
4.	Shubhangini, A. Joshi	2010	Nutrition and Dietetics with Indian case studies	McGraw Hill Education (India) Pvt., Ltd., New Delhi

Pedagogy: E-content, Lecture, Power point presentation, Seminar, Assignment, Demonstration

Course Designers

- Ms.B.Thanuja
- Ms.S.Preethi

SEMESTER – II	HUMAN PHYSIOLOGY	HOURS / WEEK – 6	
CORE COURSE - II		CREDIT – 6	
COURSE CODE – 19UND2CC2		INTERNAL 25	EXTERNAL 75

Objectives

- To augment knowledge on anatomical perception of organs and its co-ordination with other organs
- To understand the functions of the human organs.

Course outcomes

On the successful completion of the course, students will be able to:

CO Number	CO Statement	Knowledge Level
CO1.	Outline composition and functions of blood	K1
CO2.	Interpret anatomy and physiology of circulatory and respiratory system	K2
CO3.	Explain the structure, functions of nervous system and sense organs	K2
CO4.	Discuss regulation of digestive and excretory system	K2
CO5.	Relate structure and functions of endocrine and reproduction system	K3

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1.	S	M	S	M	S
CO2.	S	M	S	M	S
CO3.	S	M	S	M	S
CO4.	S	M	S	M	S
CO5.	S	M	S	M	S

S- Strong; M-Medium

Syllabus

UNIT I

BLOOD ANDCIRCULATORYSYSTEM (18Hours)

a) Blood– Composition and Functions; White Blood Cells – Types and function; Red Blood Cells – Structure and functions, Haemoglobin – Structure and functions, Erythropoiesis, Blood coagulation.

b) Reticulo- Endothelial System – Definition and functions, ABO Blood group system.

c) Lymphatic System – Lymphoid tissue, Lymph Nodes, Lymphatic Vessels, Function and Clinical Significance.

UNIT II

CARDIOVASCULAR ANDRESPIRATORYSYSTEM (18Hours)

a. HeartandCirculation: Structureofheartandbloodvessels,Propertiesofcardiacmuscle, cardiac cycle, origin and conduction of heart beat, measurement of arterial blood pressure

b. Respiratory System: Structure of Respiratory organs, Mechanics of Respiration, Artificial Respiration.

UNIT III

NERVOUS SYSTEM ANDSENSEORGANS (18Hours)

a. Nervous System: General classification of nervous system, Structure of nerve cell and Spinal cord, Basic Knowledge of different parts of the brain – anatomy and functions of cerebrum, cerebellum and medulla oblongata.

b. Sense Organs: Structure and function of eye ear, taste, smell and cutaneous sensations.

UNIT IV

DIGESTIVE SYSTEM ANDEXCRETORYSYSTEM (18Hours)

a. Digestive system: General Anatomy, Digestion in the mouth, stomach and intestines. Movements of the intestine, Role of Liver and Pancreas – Structure and Functions.

b. Excretory system:# Physiology of the Urinary System- Structure of kidney and nephron#, Formation of urine, micturition.

UNIT V

ENDOCRINE ANDREPRODUCTIVESYSTEM (18Hours)

a. **Endocrine System**: Structure and functions of thyroid, pituitary, parathyroid, Adrenals, islets of langerhans of pancreas

b. **Reproductive System**: anatomy of the male and female reproductive organs, menstrual cycle,mammaryglands,Fertilization,DevelopmentofEmbryo,Pregnancyandparturition. **# - #:**Self study

Text Books

S.No.	Author name	Year of publication	Title of the book	Publishers name
1.	Sembulingam	2016	Essentials of Medical Physiology	Health Sciences Publisher, New Delhi
2.	Subramanyam, Sarada	2018	Textbook of Human Physiology	S.Chand and company Ltd., NewDelhi

Reference Books

S.No	Author name	Year of publication	Title of the book	Publishers name
1.	Guyton	2000	Guyton and Hal Textbook of Medica Physiology	Saunders, United States of America
2.	Waugh Anne Ross and Wilson	2003	Anatomy and Physiology in Health and Illness	Churchill Livingston, New York
3.	Murugesh.N	2011	Anatomy and Physiology	Sathya Publishers, Madurai
4.	Wilson, Ross	2014	Anatomy and Physiology in Health and Illness	Reed Elsevier India Private Limited, NewDelhi

Journals

- Human Physiology, MaikNauka / Interperiodica Publishing, Russian Federation.
- Indian Journal of Clinical Anatomy and Physiology, Innovative publication PvtLTD, India.
- American Journal of Physiology - Endocrinology and Metabolism, American Physiological Society, UnitedStates.
- Canadian Journal of Physiologyand Pharmacology, Canadian Science Publishing, Nrc Research Press, Canada.

Web links

https://www.khanacademy.org/science/health-and-medicine/human-anatomy-and-physiology

Pedagogy: E-content, Lecture, Power point presentation, Seminar, Assignment

Course Designers

- Ms.S.Fathima
- Ms.B.Thanuja

SEMESTER – II	HUMAN PHYSIOLOGY - PRACTICAL	HOURS / WEEK – 3	
CORE PRACTICAL - II		CREDIT – 2	
COURSE CODE – 19UND2CC2P		INTERNAL 40	EXTERNAL 60

Objectives

- To acquire knowledge on cellular arrangements and blood components
- To learn methods to be adopted for the measurement of various blood parameters

Course outcomes

On the successful completion of the course, students will be able to:

CO Number	CO Statement	Knowledge Level
CO1.	Identify cells present in the body	K1
CO2.	Describe cellular arrangement in tissues and organs	K2
CO3.	Illustrate the methods to be adapted for the measurement of various blood parameters	K2
CO4.	Explain Cellular arrangement in tissues and organs	K2
CO5.	Predict number of cells present in blood	K3

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1.	S	M	S	M	S
CO2.	S	M	S	M	S
CO3.	S	M	S	M	S
CO4.	S	M	S	M	S
CO5.	S	M	S	M	S

S- Strong; M-Medium

Syllabus

- Histology of Tissues – Columnar, cubical, ciliated, squamous, stratified squamous.
- Microscopic structure of organs – lungs, artery, vein, stomach, ovary, testis, uterus, pancreas.
- Histology of muscles – cardiac, striated, non –striated
- Estimation of Haemoglobin, Bleeding time, Clotting time
- Measurement of Blood pressure – before and after exercise
- Determination of Pulse rate – before and after exercise.
- Determination of Bloodgroup.
- Determination of Rhfactor.
- Enumeration of Red blood cells –Demonstration.
- Enumeration of White blood cells –Demonstration.
- Differential Leucocyte count –Demonstration

Text Books

S.No.	Author name	Year of publication	Title of the book	Publishers name
1.	Sembulingam	2016	Essentials of Medical Physiology	Health Sciences Publisher, New Delhi
2.	Subramanyam, Sarada	2018	Textbook of Human Physiology	S.Chand and company Ltd., NewDelhi

Reference Books

S.No	Author name	Year of publication	Title of the book	Publishers name
1.	Waugh Anne Ross and Wilson	2003	Anatomy andPhysiology in Health and Illness	Churchill Livingston, New York
2.	MurugeshN	2011	Anatomy and Physiology	Sathya Publishers, Madurai
3.	Wilson, Ross	2014	Anatomy andPhysiology in Health and Illness	Reed Elsevier India Private Limited, New Delhi
4.	G.K.Pal and Parvati Pal	2016	Textbook of practical physiology	Universities press (India) private limited.

Pedagogy: E-content, Lecture, Power point presentation, Seminar, Assignment, Demonstration

Course Designers

- Ms.S.Fathima
- Ms.B.Thanuja

SEMESTER – II	FOOD MICROBIOLOGY & FOOD CHEMISTRY – PRACTICAL	HOURS / WEEK – 3	
FIRST ALLIED COURSE - II PRACTICAL		CREDIT – 3	
COURSE CODE – 19UND1AC1P		INTERNAL 40	EXTERNAL 60

Objectives

- To acquire knowledge on cultivation of microorganisms.
- To understand the chemical changes in food.

Course outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1.	Identify the instruments and match their application in Microbiological laboratory.	K1
CO2.	Describe the pure culture and staining techniques.	K2
CO3.	Illustrate the microbiological analysis of water.	K2
CO4.	Explain the chemistry of various nutrients present in food.	K2
CO5.	Predict the physical and chemical changes that take place during cooking.	K3

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1.	S	M	S	M	S
CO2.	S	M	S	M	S
CO3.	S	M	S	M	S
CO4.	S	S	M	M	S
CO5.	S	S	M	M	S

S- Strong; M-Medium

Syllabus

FOODMICROBIOLOGY

- Instrumentation in microbiology laboratory and their function (microscope, autoclave, hotair oven).
- Preparation of culture media.
- Pure culture techniques (spread plate, streak plate and pour plate methods).
- Staining techniques (simple and differential)
- Microbiological analysis of water.
- Isolation of spoilage organisms from different food commodities.

FOOD CHEMISTRY

- **Chemistry of Starches:** Gelatinization properties of food starches, microscopic examination of uncooked and gelatinized starch.
- **Chemistry of Sugars:** Stages of sugar cookery, sugar crystallization in preparation of fondant, fudge, and caramel
- **Chemistry of Proteins:** Gluten formation. Soaking, germination and malting of pulses, coagulation of egg white and egg yolk (Boiled Egg, Poached Egg, Omelet), coagulation and precipitation of milk, preparation techniques on meat tenderization using curd, papaya and ginger garlic paste.
- **Chemistry of Fats and Oils:** Determination of smoking temperature of different fats and oils, factors affecting absorption of fat in deep fat frying of foods.
- **ChemistryofPlantPigments:**Effectofacids,alkaliandheatonwater-solubleandfat-soluble pigments, enzymatic browning in apples, banana, brinjal and raw banana and preventive measures

TextBooks

S.No.	Author name	Year of publication	Title of the book	Publishers name
1.	Iqbal, Syed Aftab	2011	Advanced Food Chemistry,	Discovery Publishing House, New Delhi
2.	Chopra H,K and Panesar P,S	2015	Food Chemistry	Narosa Publishing House (P) Ltd, New Delhi

ReferenceBooks

S.No	Author name	Year of publication	Title of the book	Publishers name
1.	A.S.Rao	2001	Introduction to Microbiology	Prentice-Hall of India Private Ltd, NewDelhi
2.	BhartiArora, D.R.Arora	2007	Practical Microbiology	CBS Publishers &Distributors, NewDelhi
3.	Satarkar, Archana	2008	Food Science and Nutrition	ABD Publishers, Jaipur
4.	Shubhangini, A. Joshi	2010	Nutrition and Dietetics with Indian case studies	McGraw Hill Education (India) Pvt., Ltd., New Delhi

Pedagogy: E-content, Lecture, Power point presentation, Seminar, Assignment, Demonstration

Course Designers

- Ms.B.Thanuja
- Ms.S.Preethi

SEMESTER – II	FOOD CHEMISTRY	HOURS / WEEK – 4	
FIRST ALLIED COURSE – III		CREDIT – 2	
COURSE CODE – 19UND2AC2		INTERNAL 25	EXTERNAL 75

Objectives

- To gain insight into the chemistry of foods
- To understand the scientific principles involved in food preparation
- To understand the various properties exhibited by foods

Course outcomes

On the successful completion of the course, students will be able to:

CO Number	CO Statement	Knowledge Level
CO1.	State physical and chemical properties of water present in food	K1
CO2.	Interpret the structure of starch molecules	K2
CO3.	Explain the process of denaturation of proteins	K2
CO4.	Illustrate the changes that take place during temperature modifications in fats and oils.	K2
CO5.	Classify types of plant pigments	K3

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1.	S	M	M	M	S
CO2.	S	M	M	M	S
CO3.	S	M	M	M	S
CO4.	S	M	M	M	S
CO5.	S	M	M	M	S

S- Strong; M-Medium

Syllabus

UNIT I **(12Hours)**

a. Water and solutions

Water-Types and properties. Water activity in foods. Solutions, Solubility.

b. Colloidal system

Types of colloidal dispersions, sols, gels, emulsion and foams.

c. Leavening agents

Types-Physical, chemical and biological leavening agents. Mechanism of action.

d. Food additives

Classification and uses.

UNIT II **(12Hours)**

a. Starch

Components of Starch, swelling of starch granules, gel formation, retrogradation, effect of Sugar, acid, alkali, fat and surface-active agents on starch.

b. Sugars

Stages of sugar cookery, crystal formation and factors affecting crystallization. Crystalline and non crystalline candies.

Chemistry of milk sugar, non-enzymatic browning and method of prevention.

UNIT III **(12Hours)**

a. Proteins

Components of proteins, coagulation and denaturation of proteins. Effect of soaking, fermentation and germination of pulse proteins. Properties of egg protein. Chemistry of milk protein. Action of heat, acid, alkalis on vegetable and animal proteins.

UNIT IV **(12Hours)**

a. Fats and oils

#Physical and chemical properties of fats and oils#. Rancidity, hydrogenation, winterization,decompositionoftriglycerides.Shorteningpoweroffats.Changesinfats and oils during heating. Factors affecting absorption of fat in foods.

UNIT V

(12 Hours)

a. Pectin substances

Pectins, phenolic components, enzymatic browning in fruits and vegetables.

b. Plant pigments

Types of plant pigments - water and fat soluble pigments. Volatile compounds in fruits and vegetables.

- #: Self study

Textbooks

S.No.	Author name	Year of publication	Title of the book	Publishers name
1.	Yadav, Seema	2006	Food Chemistry	Anmol Publications (P) Ltd, New Delhi
2.	Iqbal, Syed Aftab	2011	Advanced Food Chemistry,	Discovery Publishing House, New Delhi
3.	Chopra H,K and Panesar P,S	2015	Food Chemistry	Narosa Publishing House (P) Ltd, New Delhi
4.	Srilakshmi B	2016	Food Science	New Age International Publishers, New Delhi

Referencebooks

S.No.	Author name	Year of publication	Title of the book	Publishers name
1.	Satarkar, Archana	2008	Food Science and Nutrition	ABD Publishers, Jaipur
2.	Shubhangini, A. Joshi	2010	Nutrition and Dietetics with Indian case studies	McGraw Hill Education (India) Pvt., Ltd., New Delhi

Journals

- Food and Nutritional Components in Focus, Royal Society of Chemistry, United Kingdom.
- Food & Function, Royal Soc Chemistry, England.
- Food Structure, Elsevier Bv, Netherlands.
- JournalofAgriculturalandFoodChemistry,AmericanChemicalSociety,United States

Web Links

https://www.sciencedirect.com/journal/food-chemistry/issueshttps://www.scribd.com/doc/61893349/Effect-of-Heat-pH-on-Color-Texture-of-Green-Vegshttps://www.uoguelph.ca/foodscience/book/export/html/1953

Pedagogy: E-content, Lecture, Power point presentation, Seminar, Assignment

Course designers

- Ms.S.Preethi
- Ms.B.Thanuja

SEMESTER - III	PRINCIPLES OF NUTRITION	HOURS / WEEK - 6	
CORE COURSE – III		CREDIT - 5	
COURSE CODE – 19UND3CC3		INTERNAL 25	EXTERNAL 75

Objectives

- To gain knowledge on classification of nutrients.
- To get insight into the role of nutrients in maintaining health of the individual and community.
- To understand the inter-relationship of the various nutrients.

Course outcomes

On the successful completion of the course, students will be able to:

CO Number	CO Statement	Knowledge Level
CO1.	Identify food sources of macro and micro nutrients.	K1
CO2.	Explain the inter– relationship between health and nutrition.	K2
CO3.	Interpret the excess and deficiency disease with a particular nutrient	K2
CO4.	Describe the evaluation of macro nutrients.	K2
CO5.	Relate water and electrolyte balance	K3

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1.	S	S	M	M	S
CO2.	S	S	M	M	S
CO3.	S	S	M	M	S
CO4.	S	S	M	M	S
CO5.	S	S	M	M	S

S- Strong; M-Medium; L-Low

SEMESTER - III	PRINCIPLES OF NUTRITION	HOURS / WEEK - 6	
CORE COURSE – III		CREDIT - 5	
COURSE CODE – 19UND3CC3		INTERNAL 25	EXTERNAL 75

Syllabus

UNIT I **(18 Hours)**

a. **Introduction to Nutrition**– Definition of nutrition, health, nutritional status and #malnutrition#. Inter-relationship between health and nutrition.

b. **RDA**– Definition, factors affecting RDA, general principles of deriving RDA (2017),Determination of RDA of different nutrients.

UNIT II **(20 Hours)**

a. **Carbohydrates** – Definition, nutritional classification, functions, RDA, sources and deficiency and excess effects. Dietary Fibre – definition, Classification, components of dietary fibre, physiological and metabolic effect, role of fibre in prevention of diseases, RDA and sources.

b. **Energy** –Forms of energy, units of measurement, determination of energy value of food, total energy requirement, energy requirements during work, thermic effect of food.

UNIT III **(18 Hours)**

a. **Proteins** – Definition, nutritional classification of proteins and amino acids, functions of proteins and amino acids, RDA, sources, and deficiency and excess. Evaluation of protein quality.(PER, BV, NEU, CS)

b. **Lipids** – Definition, nutritional classification of lipids, functions, RDA, sources. Essential fatty acids – Definition, functions, sources, deficiency and excess effects, omega fatty acids-functions and food sources.

UNIT IV **(18 Hours)**

a. **Vitamins** - Fat Soluble Vitamins(A,D,E&K) - Functions, RDA, sources, deficiency and excess. Water Soluble Vitamins(B&C) - Functions, RDA, sources, deficiency and excess.

b. **Minerals**-Macro Minerals (Calcium, Phosphorus, Magnesium, Potassium, Sodium) - Functions, RDA, sources, deficiency and excess effects.

Micro Minerals (Iron, Zinc, Iodine Selenium, Copper, Fluorine, Manganese) - Functions, RDA, sources, deficiency and excess effects.

UNIT V **(16 Hours)**

Water – Definition, distribution of water, function, requirements, sources, water balance, maintenance of water balance, distribution of electrolytes, maintenance of electrolyte balance.

#-# : Self study

Text Books

S.No.	Author name	Year of publication	Title of the book	Publishers name
1.	Swaminathan M	1999	Handbook of Food and Nutrition	Bangalore Publishing Co Ltd, Bangalore
2.	Srilakshmi B	2000	Nutrition Science	New Age International(p)ltd, New Delhi
3.	T.Longvah R.Anandhan K.Bhaskarachary K.Venkaiah	2017	Indian Food Composition Table	National Institute of Nutrition

Reference Books

S.No.	Author name	Year of publication	Title of the book	Publishers name
1.	Swaminathan M	1998	Essentials of Food and Nutrition	Bappco, Bangalore
2.	Vidya, Chintapalli	1996	Textbook of Nutrition	Discovery Book Palace(p) Ltd, Chennai
3.	Berdanier, Carolyn D	2009	Advanced Nutrition: Macronutrients, Micronutrients, and Metabolism	Atlantic Publishers and Distributors, New Delhi
4.	Raheena Begum M	2009	Textbook of Foods, Nutrition and Dietetics	Sterling Publishers, New Delhi
5.	Henry Clapp Sherman	2009	Essentials of Nutrition	The Macmillan Company
6.	Martin Eastwood	2013	Principles of Human Nutrition	Wiley Publishing
7.	Mahtab S. Bamji	2017	Textbook of Human Nutrition	Oxford & IBH Publishing Co Pvt Ltd

Journals

- Journal of Nutrition and Health, The Korean Nutrition Society, South Korea
- Indian Journal of Nutrition and Dietetics, Scientific publishers, India
- British Journal of Nutrition, Cambridge Univ Press, England

Web Links

http://www.fao.org/3/W8079E/w8079e07.htm

https://www.healthline.com/nutrition/micronutrients#deficiencies-and-toxicities

Pedagogy: E-content, Lecture, Power point presentation, Seminar, Assignment

Course designers:

- Ms.M.Vinothini
- Ms.S.Fathima

SEMESTER - III	PRINCIPLES OF NUTRITION – PRACTICAL	HOURS / WEEK - 3	
CORE PRACTICAL - III		CREDIT - 2	
COURSE CODE – 19UND3CC3P		INTERNAL 40	EXTERNAL 60

Objectives

- To gain knowledge on nutritive value of Indian foods.
- To understand the importance of nutrients.
- To know about the methods of analysis of macronutrient.

Course outcomes

On the successful completion of the course, students will be able to:

CO Number	CO Statement	Knowledge Level
CO1.	State the comparison of measurement of raw and cooked volume of food	K1
CO2.	Explain the food sources of macro and micro nutrient	K2
CO3.	Give examples of macro and micro nutrient rich recipe	K2
CO4.	Interpret the nutrient content of the recipe	K2
CO5.	Apply the procedure involved in estimation of fibre, fat and nitrogen	K3

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1.	S	S	M	M	M
CO2.	S	S	M	M	M
CO3.	S	S	S	S	S
CO4.	S	S	S	M	M
CO5.	S	S	S	M	M

S- Strong; M-Medium

Syllabus

1. Plan, prepare and calculate the nutrients of macro nutrient rich dishes

   a. Energy – High Calorie and Low Calorie

   b. Carbohydrate – High Carbohydrate and Low Carbohydrate

   c. Protein – High Protein and Low Protein

   d. Fat – High Fat and Low Fat

   e. Dietary Fibre – High Fibre and Low Fibre

2. Plan, prepare and calculate the nutrients of micro nutrient rich dishes

Vitamins: Vitamin A, Vitamin C, Thiamine, Riboflavin, Niacin, Pyridoxine, Folic Acid and Cyanocobalamine.

Minerals: Calcium, Iron, Zinc, Phosphours, Sodium and Potassium.

3. Demonstration on estimation of energy using Bomb Calorimeter.
4. Analysis of crude fibre in food using fibre plus method.
5. Demonstration on estimation of nitrogen in food using Kjeldahl method.
6. Demonstration on estimation of total fat in food using soxhlet method.

Text Books

S.No.	Author name	Year of publication	Title of the book	Publishers name
1.	Srilakshmi B	2014	Dietetics	New Age International
2.	Gajalakshmi R	2014	Nutrition Science	CBS Publishers and Distributors Pvt. Ltd
3.	Gopalan.C, Rama Sastri.V.B and Balasuramanian.S.C	2016	Nutritive Value of Indian Foods	National Institute of Nutrition(ICMR) Hyderabad

ReferenceBooks

S.No.	Author name	Year of publication	Title of the book	Publishers name
1.	Kathleen Mahan	2008	Krause's Food and Nutrition Theraphy	Saunders Elsevier,Missouri
2.	Graham Dodgshun and Michel Peters	2010	Cookery for the Hospitality Industry	Cambridge University Press,NewDelhi
3.	ThangamE.Philip	2015	Modern Cookery for Teaching and the Trade Volume-I	Orient Blackswan Private Limited, New Delhi
4.	Food Safety and Standards Authority of India	2015	Manual of Analysis of Foods	Food Safety and Standards Authority of India

Pedagogy: Lecture, Demonstration

Course Designers

- Ms.M.Vinothini
- Ms.S.Fathima

SEMESTER – III	NUTRITIONAL BIOCHEMISTRY	HOURS / WEEK - 4	
SECOND ALLIED COURSE -I		CREDIT - 4	
COURSE CODE – 19UND3AC3		INTERNAL 25	EXTERNAL 75

Objectives

- To acquire knowledge on basic concepts of biochemical reactions.
- To understand the biochemical reactions involved in the metabolism of various nutrients in the body.
- To comprehend the mode of action of different hormones.

Course outcomes

On the successful completion of the course, students will be able to:

CO Number	CO Statement	Knowledge Level
CO1.	Identify the types of enzymes involved in metabolism.	K1
CO2.	Explain the role of hormones in human body.	K2
CO3.	Describe the structure, properties, classification, function, synthesis and metabolism of macronutrients and micronutrients.	K2
CO4.	Illustrate the sugar inter-conversions	K2
CO5.	Compute ATP synthesis formed during the metabolism	K3

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1.	M	M	S	M	S
CO2.	M	M	S	M	S
CO3.	M	M	S	M	S
CO4.	M	M	S	M	S
CO5.	M	M	S	M	S

- S- Strong; M-Medium, L- Low

Syllabus

UNIT I **(10 Hours)**

Cell: Introduction, cell organelles, cell membrane, movement of the substances and water through the cell membrane, bioelectric potentials.

Enzymes: Definition, #classification of enzymes#, specificity of enzymes, factors affecting enzyme activity, enzyme inhibition.

UNIT II **(10 Hours)**

Protein: Amino acids classification, structure, properties, protein structure, peptide linkage, covalent backbone, three-dimensional conformation, quaternary structure of oligomeric proteins. Determination of –N and –C terminal amino acids, protein functions. Metabolism- synthesis of proteins and metabolism of amino acids.

Nucleotides and nucleic acids: Structure of purine and pyrimidines nucleotides, RNA – structure and types, double helical structure of DNA, biosynthesis and catabolism of purine and pyrimidine nucleotides.

UNIT III **(14 Hours)**

Carbohydrates: Classification, structure, properties and functions, carbohydrate metabolism – metabolic pathway – glycolysis, TCA cycle, HMP shunt pathway, gluconeogenesis, from TCA intermediates/ amino acids/ acetyl CoA, concept of glycogenesis and glycogenolysis.

UNIT IV **(14 Hours)**

Lipids: Classification, structure, properties, biological significance, Bioenergetics – electron transport and oxidative phosphorylation, redox potential, high energy compounds, ATP and significance, Lipid metabolism – beta oxidation of fatty acids, biosynthesis of fatty acids.

UNIT V **(12 Hours)**

Vitamins: Fat Soluble Vitamins – Classification (A, D, E, K) and its metabolism. Water Soluble Vitamins – Classification (Vitamin B1, B2, B3, B5, B6, B9, B12 and Vitamin C) and its metabolism.

Minerals: Macro Minerals – Classification (Calcium, Phosphorus, Sodium, Potassium, Magnesium) and its metabolism.

Micro Minerals – Classification (Iron, Fluorine, Zinc, Iodine, Selenium)and its metabolism.

#-# : Self study

Text Book

S.No.	Author name	Year of Publication	Title of the book	Publishers name
1.	Sucheta P Dandekai	2000	Medical Biochemistry	B.I. Churchill Livingstone
2.	Lauralee Sherwood	2007	Human Physiology 6th Edition	Thomson Brooks/cole,
3.	AmbikaShanmugam	2008	Fundamentals of Biochemistry for Medical students	Lippincott Williams & Wilkins
4.	Rafi MD, Dr NTR	2015	Textbook of Biochemistry for Medical Students	University of Health Sciences, Universities Press

Reference Books

S.No.	Author name	Year of publication	Title of the book	Publishers name
1.	Patricia Trueman,	2007	Nutritional Biochemistry,	MJP Publishers
2.	MallikarjunaRao N,	2008	Medical Biochemistry	New Age International Publishers, New Delhi
3.	Jain, J L	2008	Fundamentalsof Biochemistry	S.Chandand Company Ltd., New Delhi
4.	Robert K.Murray	2009	Harper's Illustrated Biochemistry	McGraw Hill
5.	John E. Hall	2013	Guyton & Hall Text Book of Medical Physiology	Elsevier India Private Limited, New Delhi
6.	Agarwal, G R, Meerut	2014	Text Book of Biochemistry	Krishna Prakashan Media (p) Ltd
7.	Satyanarayanan U	2014	Biochemistry,	Elsevier India Private Limited, New Delhi

Journals

- Journal of Nutritional Biochemistry, Elsevier Science Inc, United States
- Biochemistry, American Chemical Society, United States

Web links

https://opentextbc.ca/anatomyandphysiology/chapter/24-4-lipid-metabolism/
https://www.ncbi.nlm.nih.gov/books/NBK9921/

Pedagogy: E-content, Lecture, Power point presentation, Seminar, Assignment

Course designers:

- Ms.M.Vinothini
- Ms.S.Fathima

SEMESTER –III & IV	NUTRITIONAL BIOCHEMISTRY & CLINICAL BIOCHEMISTRY – PRACTICAL	HOURS / WEEK - 3	
SECOND ALLIED COURSE II - PRACTICAL		CREDIT - 3	
COURSE CODE – 19UND3AC2P		INTERNAL 40	EXTERNAL 60

Objectives

- To develop skills in handling analytical equipments.
- To understand procedures for qualitative and quantitative analysis.
- To learn the collection of blood and urine

Course outcomes

On the successful completion of the course, students will be able to:

CO Number	CO Statement	Knowledge Level
CO1.	Name the chemicals used in qualitative and quantitative analysis	K1
CO2.	Explain the procedure for quantitative analysis	K2
CO3.	Interpret the analytical results	K2
CO4.	Describe the analysis of blood and urine abnormalities in relation to diseased conditions	K2
CO5.	Apply calorimetry and chromatography techniques	K3

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1.	M	M	S	M	S
CO2.	M	M	S	M	S
CO3.	M	M	S	M	S
CO4.	M	M	S	M	S
CO5.	M	M	S	M	S

S- Strong; M-Medium

Syllabus

NUTRITIONAL BIOCHEMISTRY

- Qualitative tests for Sugars – Glucose, Fructose, Lactose, Maltose, Sucrose, Starch
- Qualitative tests for Proteins.
- Qualitative tests for Minerals.
- Quantitative estimation of Glucose.
- Quantitative estimation of Iron.
- Quantitative estimation of Calcium.
- Quantitative estimation of Ascorbic acid.

CLINICAL BIOCHEMISTRY

- Qualitative analysis of Urine for normal constituents.
- Qualitative analysis of urine for abnormal constituents.
- Estimation of blood glucose (Folin-Wu method).
- Estimation of urine glucose (Benedicts method)
- Estimation of blood urea and creatine (DAM-TSC Method).
- Estimation of urine urea (DAM-TSC Method).
- Electrophoretic pattern of blood proteins (Demonstration).
- Estimation of Serum Cholesterol (ZAK'S Method).
- Estimation of Serum Bilirubin
- Techniques of Chromatography (Paper)

Text Books

S.No.	Author name	Year of Publication	Title of the book	Publishers name
1.	Ambika Shanmugam	2008	Fundamentals of Biochemistry for Medical students	Lippincott Williams & Wilkins
2.	Rafi MD, Dr NTR	2015	Textbook of Biochemistry for Medical Students	University of Health Sciences, Universities Press

Reference Books

S.No	Author name	Year of publication	Title of the book	Publishers name
1.	Pattabiraman .N.T	2001	Laboratory Manual in Biochemistry	All India Publishers and Distributors Regd,Chennai
2.	Shanmugam.S, Sathishkumar,T, PanneerSelvam.K	2010	Laboratory handbook on biochemistry	PHI learning Private Ltd,Chennai.
3.	Murray, Robert K	2012	Harper`sIllustrated Biochemistry	Mcgraw Hill Irwin Companies, New York
4.	Das Lajja	2014	Medicinal Biochemistry,	Venus Books, New Delhi
5.	Evangeline Jones	2016	Manual of Practical Medical Biochemistry,2nd Edition	Jaypee Brothers Medical Publishers(p) Ltd.

Pedagogy: Lecture,Demonstration

Course Designers

- Ms.S.Fathima
- Ms.M.Vinothini

SEMESTER - III	BASICS IN NUTRITION	HOURS / WEEK - 2	
NON MAJOR ELECTIVE I		CREDIT - 2	
COURSE CODE – 19UND3NME1		INTERNAL 25	EXTERNAL 75

Objectives

- To gain basic knowledge on nutrients
- To understand the classification of nutrients
- To get insight into the role of nutrients in maintaining health of the individual and community

Course Outcomes

On the successful completion of the course, students will be able to:

CO Number	CO statement	Knowledge level
CO 1	Define principles in basic nutrition	K1
CO 2	Explain nutrient classifications and deficiency disorders of macro nutrients	K2
CO 3	Illustrate the sources, requirement and functions of micro nutrients	K2
CO 4	Interpret the assessment of nutritional status	K2
CO5	Apply techniques in nutritional education	K3

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1.	S	S	M	M	S
CO2.	S	S	M	M	S
CO3.	S	S	M	M	S
CO4.	S	S	M	M	S
CO5.	S	S	M	M	S

S- Strong; M-Medium

Syllabus

UNIT I **(4 Hours)**

Basics in Nutrition - Definition of Nutrition, Importance of nutrition for health, Basic five food groups, portion size of foods and the functions of food, Food pyramid, Definition and classifications of nutrients, RDA, factors affecting RDA.

UNIT II **(8 Hours)**

a. **Carbohydrates** – Nutritional classification, functions, Sources, requirement and deficiency effects. Role of fibre in human Nutrition
b. **Protein** – Nutritional classification, functions, sources, requirement and deficiency disorders.

c. Lipids – Classification, functions, sources, requirement, excess and deficiency effects.

UNIT III **(8 Hours)**

a. **Vitamins** – Fat soluble vitamins A, D, E and K - functions, sources, requirements and deficiency diseases, Water soluble vitamins – B vitamins like thiamine, Riboflavin, Niacin, Pyridoxin, Folic acid, B12 and Vitamin C - functions, sources, requirements and deficiency diseases.

b. Minerals – Calcium, phosphorus, Sodium, Potassium, Iron, Iodine, Flourine - functions, sources requirements and deficiency diseases.

c. Water – Need and Importance

UNIT IV **(6 Hours)**

Basics of assessing nutritional status – Anthropometric measurements (BMI, WHR, Broka's Index), Biochemical, Clinical and Dietary (24 hour recall method and Food Frequency Method)

UNIT V **(4 Hours)**

Nutrition Education –Tools, Steps, Nutrition education for Prevention of underweight, overweight, obesity, anaemia and diabetes mellitus

Text Books

S.No.	Author name	Year of Publication	Title of the book	Publisher name
1.	Srilakshmi B	2012	Nutrition Science	New Age International Publishers, New Delhi
2.	SwaminathanM	2012	Hand book of Food and Nutrition	Bangalore printing and publishing co., Ltd, Bangalore
3.	Raheena Begum M	2012	A Text Book of Foods, Nutrition and Dietetics	Sterling publishers private Limited,

Reference Books

S.No.	Author name	Year of Publication	Title of the book	Publisher name
1.	Gajalakshmi R	2014	Nutrition Science	CBS Publishers and distributors Pvt Ltd, New Delhi,
2.	Indrani T.K	2008	Nursing Manual of Nutrition and Therapeutic Diet,	Jaypee Brothers, Medical publishers (p) Ltd, New Delhi,
3.	Shubhangini Joshi A,	2014	Nutrition and Dietetics	MC Graw Hill Education (India) (P) Ltd, New Delhi,
4.	Srilakshmi B,	2014	Nutrition Science	New Age International Publishers, New Delhi

Journals:

- Journal of the Korean Society of Food Science and Nutrition, Korean Society of Food Science and Nutrition, South Korea.
- Food and Agricultural Immunology, Taylor & Francis, England.
- Nutrition and Food Science, Emerald Group Publishing Ltd, United Kingdom.

Web links:.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3995129/
http://www.tuscany-diet.net/carbohydrates/classification-functions/
https://www.nia.nih.gov/health/vitamins-and-minerals
Pedagogy: E-content, Lecture, Power point presentation, Seminar, Assignment
Course Designers

- Ms.E.Agalya
- Ms.S.Fathima

SEMESTER - IV	NUTRITION THROUGH LIFE CYCLE	HOURS / WEEK - 5	
CORE COURSE - IV		CREDIT - 5	
COURSE CODE – 19UND4CC4		INTERNAL 25	EXTERNAL 75

Objectives

- To understand the importance of nutrition and health.
- To obtain knowledge on the nutritional needs pertaining to different stages of life.
- To plan diet for various age groups.

Course outcomes

On the successful completion of the course, students will be able to:

CO Number	CO Statement	Knowledge Level
CO1.	List nutritional requirements for all age groups	K1
CO2.	Explain the balanced diet and food groups	K2
CO3.	Explain the physiological changes that take place during pregnancy and lactation.	K2
CO4.	Give examples of weaning foods and low cost supplementary foods.	K2
CO5.	Compute nutritive value for different age groups according to RDA.	K3

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1.	S	S	M	M	S
CO2.	S	S	M	M	S
CO3.	S	S	M	M	S
CO4.	S	S	M	M	S
CO5.	S	S	M	M	S

S- Strong; M-Medium

Syllabus

UNIT I **(15 Hours)**

a) Introduction to Nutrition - #Balanced diet, Basic five food groups#, RDA, factors affecting RDA.

b) Menu planning - Definition, principles of menu planning, points to be considered in menu planning, steps involved in planning menu.

UNIT II **(15 Hours)**

a) Nutrition for Pregnancy –Physiological changes, nutritional problems, complications, food and nutritional requirements, dietary guidelines.

b)Nutrition for Lactation – Role of hormones in milk production, factors affecting the volume and composition of breast milk, role of galactogogues, food and nutritional requirements, dietary guidelines, Lactation failure and factors responsible for lactation failure.

UNIT III **(15 Hours)**

a) Nutrition for Infants- Growth and development, importance of breast feeding, advantages of breast feeding, food and nutritional requirements. Weaning – Definition, types of supplementary foods, points to be considered in introducing weaning foods.

b) Nutrition for Preschoolers – Growth and development, food and nutritional requirements, factors affecting nutritional status, low cost supplementary foods and nutritional problems among preschoolers.

UNIT IV **(15 Hours)**

a) Nutrition for school going children – Growth and development, food and nutritional requirement, packed lunch – factors to be considered, sample menu, school lunch programmes, nutritional problems.

b) Nutrition for adolescent – Growth and development, body composition, puberty, secondary sexual characteristics, food and nutritional requirements, dietary guidelines, nutritional problems.

UNIT V **(15 Hours)**

a) Nutrition for adulthood – Food and nutritional requirements, dietary guidelines, nutritional problems.

b) Nutrition for old age –Process of ageing, food and nutritional requirement, dietary guidelines, nutrition related problems, degenerative diseases.

#-# : Self study

Text Books

S.No.	Author name	Year of publication	Title of the book	Publishers name
1.	Srilakshmi B	2014	Dietetics	New Age International , New Delhi.
2.	Gajalakshmi R	2014	Nutrition Science	CBS Publishers and Distributors Pvt. Ltd

Reference Books

S.No.	Author name	Year of publication	Title of the book	Publishers name
1.	Sari Edelstein	2009	Life cycle nutrition	Jones and Bartlett Publisher
2.	Barasi, Mary E, Great Britain	2002	Human Nutrition: Health Perspective	Hodder and Stoughton
3.	Swaminathan M	2012	Handbook of Food and Nutrition	Bangalore Publishing Co Ltd
4.	Townsend, Carolynn E	2000	Nutrition and Diet Therapy	London: I.T.P an International Thomson Publishing Company
5.	Gopalan.C, Rama Sastri.V.B and Balasuramanian.S.C	2016	Nutritive Value of Indian Foods	National Institute of Nutrition(ICMR) Hyderabad

Journals

- Journal of Nutrition and Metabolism, Biomed central, United kingdom
- Pregnancy Hypertension, Elsevier Bv, Netherlands

Web links

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5104202/

https://www.ncbi.nlm.nih.gov/books/NBK525242/

https://www.health.gov.il/English/Topics/SeniorHealth/HealthPromo/Pages/nutrition-elderly.aspx

Pedagogy: E-content, Lecture, Power point presentation, Seminar, Assignment, Group discussion.

Course Designers

- Ms.M.Vinothini
- Ms.S.Fathima

SEMESTER - IV	NUTRITION THROUGH LIFE CYCLE -PRACTICAL	HOURS / WEEK - 3	
CORE PRACTICAL - IV		CREDIT - 2	
COURSE CODE – 19UND4CC4P		INTERNAL 40	EXTERNAL 60

Objectives

- To gain knowledge on nutritive value of Indian foods.
- To understand the importance of nutrients.

Course Outcomes

On the successful completion of the course, students will be able to:

CO Number	CO Statement	Knowledge Level
CO1.	Identify the physiological changes take place during all age group	K1
CO2.	Explain the importance of RDA for all age group	K2
CO3.	Describe the meal plan according to the age group	K2
CO4.	Interpret the nutrient content of the planned recipe with RDA	K2
CO5.	Prepare a planned meal based on the RDA for all age group	K3

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1.	S	S	M	M	S
CO2.	S	S	M	M	S
CO3.	S	S	M	M	S
CO4.	S	S	M	M	S
CO5.	S	S	M	M	S

S- Strong; M-Medium

Syllabus

NUTRITION THROUGH LIFE CYCLE -PRACTICAL

Plan, calculate nutritive value and prepare meal for

- Pregnant women
- Lactating women
- Infant
- Preschooler
- School going children
- Adolescent
- Adult
- Old age

Text Books

S.No.	Author name	Year of publication	Title of the book	Publishers name
1.	Srilakshmi B	2014	Dietetics	New Age International
2.	Gajalakshmi R	2014	Nutrition Science	CBS Publishers and Distributors Pvt. Ltd
3.	Gopalan.C, Rama Sastri.V.B and Balasubramanian.S.C	2016	Nutritive Value of Indian Foods	National Institute of Nutrition(ICMR) Hyderabad

Reference Books

S.No.	Author name	Year of publication	Title of the book	Publishers name
1.	Graham Dodgshun and Michel Peters	2010	Cookery for the Hospitality Industry	Cambridge University Press, New Delhi
2.	ThangamE.Philip	2015	Modern Cookery for Teaching and the Trade Volume-I	Orient Blackswan Private Limited, New Delhi
3.	Kathleen Mahan	2008	Krause's Food and Nutrition Therapy	Saunders Elsevier, Missouri

Pedagogy: Practical,Demonstration

Course Designers

- Ms.M.Vinothini
- Ms.S.Fathima

SEMESTER – IV	NUTRITIONAL BIOCHEMISTRY & CLINICAL BIOCHEMISTRY – PRACTICAL	HOURS / WEEK - 3	
SECOND ALLIED COURSE II - PRACTICAL		CREDIT - 3	
COURSE CODE – 19UND3AC2P		INTERNAL 40	EXTERNAL 60

Objectives

- To develop skills in handling analytical equipment.
- To understand procedures for qualitative and quantitative analysis.

Course outcomes

On the successful completion of the course, students will be able to:

CO Number	CO Statement	Knowledge Level
CO1.	Name the chemicals used in qualitative and quantitative analysis	K1
CO2.	Explain the procedure for quantitative analysis	K2
CO3.	Interpret the analytical results	K2
CO4.	Describe the analysis of blood and urine abnormalities in relation to diseased conditions	K2
CO5.	Apply colorimetry and chromatography techniques	K3

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1.	M	M	S	M	S
CO2.	M	M	S	M	S
CO3.	M	M	S	M	S
CO4.	M	M	S	M	S
CO5.	M	M	S	M	S

S- Strong; M-Medium

Syllabus

NUTRITIONAL BIOCHEMISTRY

- Qualitative tests for Sugars – Glucose, Fructose, Lactose, Maltose, Sucrose, Starch
- Qualitative tests for Proteins.
- Qualitative tests for Minerals.
- Quantitative estimation of Glucose.
- Quantitative estimation of Iron.
- Quantitative estimation of Calcium.
- Quantitative estimation of Ascorbic acid.

CLINICAL BIOCHEMISTRY

- Qualitative analysis of Urine for normal constituents.
- Qualitative analysis of urine for abnormal constituents.
- Estimation of blood glucose (Folin-Wu method).
- Estimation of urine glucose (Benedicts method)
- Estimation of blood urea and creatine (DAM-TSC Method).
- Estimation of urine urea (DAM-TSC Method).
- Electrophoretic pattern of blood proteins (Demonstration).
- Estimation of Serum Cholesterol (ZAK'S Method).
- Estimation of Serum Bilirubin(Ehrlich's Diazo reagent method)
- Techniques of Chromatography (Paper)

Text Books

S.No.	Author name	Year of Publication	Title of the book	Publishers name
1.	AmbikaShanmugam	2008	Fundamentals of Biochemistry for Medical students	Lippincott Williams & Wilkins
2.	Rafi MD, Dr NTR	2015	Textbook of Biochemistry for Medical Students	University of Health Sciences, Universities Press

Reference Books

Pedagogy: Lecture, Demonstration, Practical

S.No.	Author name	Year of publication	Title of the book	Publishers name
1.	Pattabiraman .N.T	2001	Laboratory Manual in Biochemistry	All India Publishers and Distributors Regd,Chennai
2.	Shanmugam.S, Sathishkumar,T, PanneerSelvam.K	2010	Laboratory handbook on biochemistry	PHI learning Private Ltd,Chennai.
3.	Murray, Robert K	2012	Harper`sIllustrated Biochemistry	Mcgraw Hill Irwin Companies, New York
4.	Das Lajja	2014	Medicinal Biochemistry	Venus Books, New Delhi
5.	Evangeline Jones	2016	Manual of Practical Medical Biochemistry,2nd Edition	Jaypee Brothers Medical Publishers(p) Ltd.

Course Designers

- Ms.S.Fathima
- Ms.M.Vinothini

SEMESTER - IV	CLINICAL BIOCHEMISTRY	HOURS / WEEK - 3	
SECOND ALLIED COURSE - III		CREDIT - 2	
COURSE CODE – 19UND4AC4		INTERNAL 25	EXTERNAL 75

Objectives

- To enable the students to gain knowledge on regulation of metabolism.
- To understand the relationship of biochemical changes to health and diseases.

Course outcomes

On the successful completion of the course, students will be able to:

CO Number	CO Statement	Knowledge Level
CO1.	Identify Biochemical data	K1
CO2.	Explain Carbohydrate disorders	K2
CO3.	Assess Protein disorders	K2
CO4.	Illustrate fat disorders	K2
CO5.	Prepare appropriate technique to evaluate various organ Functions	K3

Mapping with Programme Outcomes

COS	PO1	PO2	PO3	PO4	PO5
CO1.	M	M	S	M	S
CO2.	M	M	S	M	S
CO3.	M	M	S	M	S
CO4.	M	M	S	M	S
CO5.	M	M	S	M	S

S- Strong; M-Medium

Syllabus

UNIT I **(9 Hours)**

Biochemical Data Acquisition, Interpretation and Laboratory Techniques

General lab information, #units of measure-enzymes, hormones, electrolytes#, uses of biochemical data in clinical medicine. Acquisition and interpretation of biochemical data. Tools of biochemistry.

UNIT II **(9 Hours)**

Disorders of carbohydrate metabolism

Glucose homeostasis, Diabetes mellitus, ketone bodies, macro angiopathy and microangiopathy. Glucose tolerance tests and glycosylated hemoglobin. Inborn errors of carbohydrate metabolism, Glycogen storage diseases, Galactosemia,

UNIT III **(9 Hours)**

Disorders of Protein metabolism

Phenylalanemia, homocystinuria, tyrosinemia, MSUD, phenylketonuria, alkaptonuria, albinism and animoacidurias. Disorders in purine/ pyrimidine metabolism

UNIT IV **(9 Hours)**

Disorders of Fat metabolism

Disorders in lipids-Gaucher, Tay-Sach, Niemann-Pick, Farber's, Gangliosidosis, Steatorhea, Dyslipidemia, Atherosclerosis, Coronary Artery Disease, Disorders of Lipoproteins.

UNIT V **(9 Hours)**

Organ Function Tests

Kidney function test –Clearance test (Urea and creatinine clearance test), Measurement of Osmolality (ADH test, Dilution test)

Liver function test –Tests based on excretory function, Based on metabolic capacity of liver, Tests based on serum enzymes, and synthetic function of liver.

Gastric function test –Fractional test meal, Stimulation test, Estimation of free acidity and total acidity

Pancreas Function test –Amylase and Lipase test

#-# : Self study

Text Books

S.No	Author name	Year of Publication	Title of the book	Publishers name
1.	Satyanarayana.U	2016	Fundamentals of Biochemistry	ks and Allied (p) Ltd, Kolkata
2.	AmbikaShanmugam,	2016	Fundamentals of biochemistry for medical students,8th Edition	Lippincott Williams and Wilkin

Reference Books

S.No	Author name	Year of publication	Title of the book	Publishers name
1.	Das Lajja	2014	Medicinal Biochemistry,	Venus Books, New Delhi
2.	Murray, Robert K	2012	Harper`sIllustrated Biochemistry	Mcgraw Hill Irwin Companies, New York

Journals

- CPD Bulletin Clinical Biochemistry,Rila Publications, Ltd, United Kingdom.
- Annals of Clinical Biochemistry, Sage Publications Inc, England.
- Clinical Biochemistry, Pergamon-Elsevier Science Ltd, Canada.
- Indian Journal of Clinical Biochemistry, Association of Clinical Biochemists of India.
- Journal of Clinical Biochemistry and Nutrition Japan.

Web Links

https://ncdc.gov.in/
http://aiihph.gov.in/department-of-biochemistry-and-nutrition/

Pedagogy: E-content, Lecture, Power point presentation, Seminar, Assignment

Course Designers

- Ms.M.Vinothini
- Ms.S.Fathima

SEMESTER - IV	NUTRITION FOR THE FAMILY	HOURS / WEEK - 2	
NON MAJOR ELECTIVE II		CREDIT - 2	
COURSE CODE – 19UND4NME2		INTERNAL 25	EXTERNAL 75

Objectives

- To understand the role of nutrition in different stages of life cycle.
- To gain experience in planning menu for different stages of life cycle.
- To develop skills in organizing and evaluating nutrition projects in the community.

Course Outcomes

On the successful completion of the course, students will be able to:

CO Number	CO statement	Knowledge level
CO 1	Identify the inter relationship between health and nutrition	K1
CO 2	Explain menu planning principles for different stages of life cycle	K2
CO 3	Explain importance of RDA	K2
CO 4	Interpret nutritional problems throughout life cycle	K2
CO 5	Apply basic therapeutic principles in menu planning	K3

Mapping with programme outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	M	S
CO2	S	S	M	M	S
CO3	S	S	M	M	S
CO4	S	S	M	M	S
CO5	S	S	M	M	S

S- Strong; M-Medium

Syllabus

UNIT I **(6 Hours)**

a) **Principles of Nutrition**–#Classification and functions of Nutrients#. Inter relationship between health and nutrition, malnutrition, over nutrition, under nutrition. Principles of meal planning, RDA.

b) **Nutrition for Pregnancy** - Physiological changes and complications during Pregnancy, food and nutritional requirements during pregnancy.

c) **Nutrition for Lactation-** Physiology of Lactation, food and nutritional requirements of lactating women.

UNIT II **(6 Hours)**

a) **Nutrition for Infants -**Importance of breast milk, food and nutritional requirements for infants, weaning and supplementary foods for infants.

b) **Nutrition for Preschoolers** Food habits of preschoolers, food and nutritional requirements for preschool children.

UNIT III **(6 Hours)**

a) **Nutrition for School Age -**Food and Nutritional requirements for school going children, nutritional problems.

b) **Nutrition for Adolescents**-Food and Nutritional requirements for adolescence and eating disorders.

UNIT IV **(6 Hours)**

a) **Nutrition during Adulthood -**Reference man and Reference woman, Food and nutritional requirements for adults.

b) **Nutrition during Old age** - Nutritional requirements, nutritional problems and dietary management.

UNIT V **(6 Hours)**

Basics in therapeutic menu planning – Characteristics of clear fluid, full fluid soft diet. Therapeutic dietary principles - Energy – High calorie and Low calorie, Carbohydrate – High carbohydrate and Low carbohydrate, Protein – High protein and Low protein, Fat – High fat and Low fat, Dietary fibre – High fibre and Low fibre.

#-# : Self study

Textbooks

No.	Author name	Year of Publication	Title of the book	Publisher name
1.	Srilakshmi B	2012	Nutrition Science	New Age International Publishers, New Delhi
2.	SwaminathanM	2012	Hand book of Food and Nutrition	Bangalore printing and publishing co., Ltd, Bangalore
3.	Raheena Begum M	2012	A Text Book of Foods, Nutrition and Dietetics	Sterling publishers private Limited

Reference Books

S.No.	Author name	Year of Publication	Title of the book	Publisher name
1.	Gajalakshmi R	2008	Nutrition Science	CBS Publishers and distributors Pvt Ltd, New Delhi,
2.	Indrani T.K	2008	Nursing Manual of Nutrition and Therapeutic Diet	Jaypee Brothers, Medical publishers (p) Ltd, New Delhi
3.	Shubhangini Joshi A	2014	Nutrition and Dietetics	MC Graw Hill Education (India)
4.	Srilakshmi B	2014	Dietetics	New Age International Publishers, New Delhi

Journals

- Nutrition, Elsevier Science Inc, United States.
- Journal of Youth and Adolescence, Springer/Plenum Publishers, United States.
- Journal of Food and Nutrition Research,Vup Food Research Inst, Bratislava, Slovakia.

Web links

https://www.ncbi.nlm.nih.gov/books/NBK209825/
https://www.who.int/nutrition/topics/nutrecomm/en/

Pedagogy: E-content, Lecture, Power point presentation, Seminar, Assignment, Quiz.

Course Designers

- Ms.B.Thanuja
- Ms.E.Agalya

SEMESTER – IV	I.A.REGIONAL CUISINES	HOURS / WEEK - 2	
SKILL BASED ELECTIVE – I		CREDIT - 2	
COURSE CODE – 19UND4SBE1A		INTERNAL 25	EXTERNAL 75

Objectives

- To gain knowledge on Indian regional cuisines.
- To understand the basic culinary terms.

Course outcomes

On the successful completion of the course, students will be able to:

CO Number	CO Statement	Knowledge Level
CO1.	Identify role of spices in Indian cookery	K1
CO2.	Describe the characteristics of regional cuisines	K2
CO3.	Describe the food habits of various Indian region	K2
CO4.	Categorize cooking methods applied in Indian regional cuisines	K3
CO5.	Categorize speciality cuisines of Indian festivals	K3

Mapping with programme outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1	S	M	M	S	M
CO2	S	M	M	S	M
CO3	S	M	M	S	M
CO4	S	M	M	S	M
CO5	S	M	M	S	M

S- Strong; M- Medium

Syllabus

UNIT I **(6 Hours)**

Introduction to Indian Cuisines

Introduction to Indian food, Philosophy of Indian cooking, influence of the invaders and travellers on Indian cuisine. #Spices and Condiments used in Indian cookery#, masala and Pastes. Basic gravies- Makhni gravy, Tomato onion gravy, Hariyali gravy, White gravy, Regional gravies.

UNIT II **(6 Hours)**

Famous cuisines - North and West Regions of India

Origin of tandoor and dum cooking, special equipment and their uses, workflow, tenderizing agents used in Indian cooking. Introduction to North Indian cuisine - Kashmir Cuisine, Punjabi Cuisine, MughalaiandAwadh Cuisine, Rajasthani Cuisine. West region cuisine -Gujarati Cuisine, Maharastrian Cuisine, Vidharbha, Kohlapur, Maratwada, Konkan, Goan Cuisine.

UNIT III **(6 Hours)**

Famous cuisines - North Eastern India

Introduction to North Eastern Indian cuisine - Staple foods, special food habits, various cooking methods and characteristics of Assamese, Arunachal Pradesh, Bihar, Manipuri, Meghalaya, Mizoram, Nagaland, Sikkim, Tripuri Cuisines.

UNIT IV **(6 Hours)**

Famous cuisines - Central India

Introduction to Central Indian cuisine – Staple foods, food habits, special occasion foods and characteristics of Madhya Pradesh and Odissi cuisines.

UNIT V ` **(6 Hours)**

Famous cuisines- South India

Heritage of South Indian cuisines, Factors that affect eating habits in south Indian region, Speciality cuisines for festivals and special occasions. Characteristics of Tamil Nadu Cuisine, Hyderabad and Andhra Cuisine, Kerala cuisine and Karnataka cuisine.

#-# : Self study

Text books

S.No.	Author name	Year of publication	Title of the book	Publishers name
1.	Krishna arora	2011	Theory of cookery	Frank bros&co, Noida
2.	Graham Dodgshun	2008	Cookery for the hospitality industry	Cambridge University Press

Reference books

S.No.	Author name	Year of publication	Title of the book	Publishers name
1.	Linda Civitello	2011	Cuisine and culture	John Wily & sons, New jersey
2.	ParvinderS.Bali	2014	Food Production Operations	Oxford University Press, New Delhi
3.	ParvinderS.Bali	2012	International Cuisines and Food production Management	Oxford University Press, New Delhi

Journals:

- Journal of Culinary Science and Technology

Web links:

http://www.tasteofindiabtown.com/menu/TOI_webmenu_082410.pdf
https://en.wikipedia.org/wiki/South_Indian_cuisine
https://www.indianembassybeirut.gov.in/pdf/Introduction_to_Indian_Cuisine.pdf
http://www.itrhd.com/magazine/special-issue1.pdf
https://www.academia.edu/32998366/Indian_cuisines_representing_Indian_culture
https://www.tandfonline.com/doi/full/10.1080/1743873X.2013.767818?src=recsys

Pedagogy: E-content, Lecture, Power point presentation, Seminar, Assignment, Industrial visit

Course Designers

- Ms. S. Fathima
- Ms. T.R. Revathi

SEMESTER – IV	I.B.BASICS IN FOOD PRODUCTION	HOURS / WEEK - 2	
SKILL BASED ELECTIVE - I		CREDIT - 2	
COURSE CODE – 19UND4SBE1B		INTERNAL 25	EXTERNAL 75

Objectives

- To acquire knowledge on environmental set up for cooking.
- To learn various methods and techniques of Cooking.

Course outcomes

On the successful completion of the course, students will be able to:

CO Number	CO Statement	Knowledge Level
CO1.	Identify uses of equipment in food production	K1
CO2.	Explain pre - preparation techniques for Cooking	K2
CO3.	Illustrate basic preparation of **s**alads, soups and sauces	K2
CO4.	Describe egg, fish and meat cookery	K3
CO5.	Apply bakery principles and techniques in the preparation of cakes, cookies and biscuits	K3

Mapping with programme outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	M	S
CO2	S	S	M	M	S
CO3	S	S	M	M	S
CO4	S	S	M	M	S
CO5	S	S	M	M	S

S- Strong; M-Medium

Syllabus

UNIT I **(6 Hours)**

Organization of Kitchen, Storage and Service Spaces

Size and type of kitchens, designing kitchens, layout of kitchens (General layout of kitchen in various organizations).Location of storage spaces, types of storage, planning storage spaces. Location and planning service areas.

Equipment – Classification, #uses of equipment in food production#.

UNIT II **(6 Hours)**

Pre-preparation

Pr**e**-Preparation-Meaning of terms -Washing, peeling, paring, Cutting, mirepox, mincing, meringue, mandolin, macedoine, shredding, slicing, slitting, grating, grinding, mashing, pureeing, sieving, rendering, filtration, flavouring, folding, homogenization, beating, blending, creaming, kneading, marinating, whipping, stirring.

Cooking

Cooking -Objectives and methods of cooking (Moist heat, Dry heat, Fat as a medium of cooking, Microwave and Solar cooking)

UNIT III **(6 Hours)**

Preparation of Salads, Soups and Sauces

Classification of salad, parts of salad, salad dressings. Stocks, classification of soups, garnishes for soups. Classification of sauces, importance in food preparations.

UNIT IV **(6 Hours)**

Fish, Egg and Meat Cookery

Fish Cookery-Classification of fish with examples, selection of fish, pre-preparation of fish for cooking , Cooking of fish **.**Egg cookery –Uses of egg in food preparations, methods of cooking. Meat Cookery- Methods of tenderization of meat **,**meat cookery.

UNIT V **(6 Hours)**

Fundamentals in the preparation of Cakes, Cookies and Biscuits

Role of ingredients, principles involved in preparation of cake, balancing of cake formula, cake faults and their causes .Difference between cookies and biscuits, Role of ingredients, principles involved in preparation of cookies, types of cookies, faults and their causes in making cookies.

#-# : Self study

Text books

S.No.	Author name	Year of publication	Title of the book	Publishers name
1.	Krishna Arora	2005	Theory of cookery	Fronk Bros and co.Publishers, New Delhi
2.	R.Singaravelavan	2006	Food & Beverage Service	Oxford University press
3.	Yogambal Ashokkumar	2009	Text book of Bakery and Confectionary	Prentice-hall of India Pvt. Ltd
4.	V.Cessarani and R.Kinton	2002	Practical Cookery	Hodder and Stoughton publishers

Reference books

S.No.	Author name	Year of publication	Title of the book	Publishers name
1.	Thangam Philip	2005	Modern Cookery	Orient Longmam Limited, Bangalore
2.	Vijay Dhawan	2007	Food & Beverage Service	Frank Bros&co, New Delhi

Journals

- Journal of Food Industry, Macro think Institute**,** United States.
- Journal for Food Processing and beverages, Avens Publishing Group, India.

Web links

http://esu-services.ch/projects/lcafood/

https://www.tutorialspoint.com/

http://www.yourarticlelibrary.com/home-science/food-production/soup-meaning-and-classification-food- production/86444
https://sielearning.tafensw.edu.au/toolboxes/KitchenOps/tools/kitchen/hfood/soups.html
https://getrevising.co.uk/revision-notes/pastry_making

Pedagogy: E-content, Lecture, Power point presentation, Seminar, Assignment, Demonstration, Visit to food production units.

Course Designers

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