B.Sc. Nutrition and Dietetics

SYLLABUS

(2021 onwards)

P. G. Department of Food and Nutrition

BISHOP HEBER COLLEGE (Autonomous)
TIRUCHIRAPPALLI - 620 017

Department of Food and Nutrition

Vision

- The department seeks to function with mutual love and social commitment to educate and engage students in research and extension activities to serve the community.

Our Mission

- Provide opportunity to students to realize their potential in the broad and diverse domains of Nutrition and Dietetics through teaching, innovation, training, research & mentorship on how nutrients impact human health and disease.
- Provide opportunities to students to master communication Skills that prepares students for supervised practice through internships and extension activities leading to be a professional dietitians in providing service to professional, governmental and local community.
- Propagate student curiosity and inquiry about the theory and practice of dietetics that will lead to discovery and application of new ideas and knowledge

On Successful Completion of B.Sc. Nutrition and Dietetics program, the Graduates will be able to

Knowledge

PO1 Recognize the composition of different foods and their physical, chemical and biological changes that occur during cooking/ processing of foods and their effect on human beings.

PO2 Extend nutrition services ***as public health nutritionist, dietician nutritionist, clinical nutritionist or sports nutritionist*** to a diverse community.

PO3 Provide nutrition education to individuals, groups, and communities through out the life span using a variety of communication strategies including ICT

Attitude

PO4 Engage in self-directed continuous learning aimed at global competency, which will promote professional and personal growth.

Skills

PO5 Apply knowledge of public health, diseases, technical skills, clinical judgment and decision-making to make appropriate life style and food choices.

PO6 Implement strategies with reference to food access, procurement, Preparation, and safety

PO7 Analyze, interpret, evaluate and use professional literature to make evidence based decisions facilitating professional collaborations in the field of Nutrition and Dietetics

PO8 Evaluate, adopt and apply the best practices relating to health, safety, Quality and client satisfaction in the field o fNutritionand Dietetics.

Ethical & Social Responsibility

PO9 Develop management skills and entrepreneurial skills, by harnessing core Competencies tempered by values and ethics

Programme Specific Outcomes

B.Sc. Nutrition & Dietetics

On successful completion of B.Sc., Nutrition and Dietetics program, the Graduate will be able to

Intellectual Skills

PSO1 Identify the components of foods and apply the concepts learned to provide professional nutrition services in a wide variety of settings including academic, hospital, government, corporate, military, sports and community-based organization.

Practical Skills

PSO2 Exhibit skill and confidence to cater to the nutritional needs of diverse Population

PSO3 Apply knowledge of food, nutrition and dietetics to develop practical skills of management of dietary departments of the various organizations

Transferable Skills

PSO4 Apply the principles of food science to produce commercial products for the benefit of the society honing the entrepreneur skills in students

B.Sc. Nutrition and Dietetics Programme

Sem	Course	Course Title	Course Code	Hrs/ week	Credits	Marks		
						CIA	ESE	Total
I	Tamil I	Tamil		6	3	25	75	100
	English I	English for communication		6	3	25	75	100
	Core I	Food Science	U17ND101	4	4	25	75	100
	Core Prac. I	Food Science Practical	U17ND1P1	3	2	40	60	100
	Allied I	Food Microbiology	U17ND1Y1	4	4	25	75	100
	Allied Prac.	Food Microbiology & Food chemistry Practical	U17NDYP1	3*		40	60	100
	Env. Stud	Environmental studies		2	2	25	75	100
	Value Education	RI/MI		2	2	25	75	100
II	Tamil II	Tamil		6	3	25	75	100
	English II	English for communication		6	3	25	75	100
	Core II	Human Physiology	U17ND202	6	6	25	75	100
	Core Prac. II	Human Physiology Practical	U17ND2P2	3	2	40	60	100
	Allied II	Food Chemistry	U17ND2Y2	4	4	25	75	100
	Allied Prac.I	Food Microbiology & Food chemistry Practical	U17NDYP1	3*	3	40	60	100
	SBEC I	Food Sanitation and Hygiene	U21ND2S1	2	2	40	60	100
III	Tamil III	Tamil		6	3	25	75	100
	English III	English		6	3	25	75	100
	Core III	Principles of Nutrition	U17ND303	6	5	25	75	100
	Core Prac. III	Principles of Nutrition Practical	U17ND3P3	3	2	40	60	100
	Allied III	Food Standard and Quality Control	U17ND3Y3	4	4	25	75	100
	Allied Prac.II	Food Standard and Quality Control & Nutritional Biochemistry Practical	U17NDYP2	3*	3	--	--	--
	NMEC –I	To be selected from the courses offered by other departments		2	2	25	75	100
IV	Tamil IV	Tamil		5	3	25	75	100
	English IV	English through extensive reading		5	3	25	75	100
	Core IV	Nutrition Through Life Cycle	U17ND404	6	6	25	75	100
	Core Prac. IV	Nutrition Through Life Cycle Practical	U17ND4P4	3	2	40	60	100
	Allied IV	Nutritional Biochemistry	U17ND4Y4	4	3	25	75	100
	Allied Prac.II	Food Standard and Quality Control & Nutritional Biochemistry Practical	U17NDYP2	3*	3	40	60	100
	NMEC-II	To be selected from the courses offered by other departments		2	2	25	75	100
	Soft Skills	Life skills	U16LFS41	2	1			100
	Extension activities	NSS, NCC, Rotract, Leo Club, Etc.	U16ETA41		1			

Sem	Course	Course Title	Course Code	Hrs/ week	Credits	Marks		
						CIA	ESE	Total
V	Core V	Dietetics –I	U17ND505	6	6	25	75	100
	Core VI	Community Nutrition	U17ND506	6	6	25	75	100
	Core Prac. V	Dietetics –I Practical	U17ND5P5	4	2	40	60	100
	Elective I	Food processing/Functional Foods	U21ND5:1/ U21ND5:2	5	5	25	75	100
	Elective II	PRMID/Nutrition in special condition	U21ND5:3/ U21ND5:4	5	5	25	75	100
	SBEC – II	Diet and Counselling	U21ND5S2	2	2	40	60	100
	SBEC –III	Entrepreneurship Development	U21ND5S3	2	2	40	60	100
VI	Core VII	Dietetics –II	U17ND607	6	5	25	75	100
	Core VIII	Fitness and Sports nutrition	U17ND608	6	5	25	75	100
	Core IX	Institutional Food Service management	U17ND609	6	5	40	60	100
	Core Prac. IV	Dietetics –II Practical & Dietary Internship	U17ND6P6	3	2	40	60	100
	Elective III	Food product development and marketing strategy	U21ND6:3	5	5	25	75	100
	Core Project	Project	U17ND6J2	4	3			100
		Extension activities Gender studies			1 1			

Part I	:	4	SBEC	:	3
Part II	:	4	NMEC	:	2
Core Theory	:	9	Environmental Studies	:	1
Core Practicals	:	6	Extension Studies	:	1
Allied Theory	:	4	Value Education	:	1
Allied Practicals	:	2	Gender Studies	:	1
Elective	:	3			

Total Courses : 40

Total credits : 140

NMEC offered by the department

1. Basics in Nutrition
2. Diet in health and disease

SBEC – Skill Based Elective Courses;

NMEC – Non Major Elective Courses;

*Other Languages	Hindi	Sanskrit	French		Hindi	Sanskrit	French
Semester I				Semester III			
Semester II				Semester IV			

Programme Articulation

Course Name	Course code	Correlation with Programme Outcomes and Programme Specific Outcomes												
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
Food Science	U17ND101	H	-	L	M	L	M	-	M	L	H	-	H	H
Food Science Lab	U17ND1P1	H	-	L	M	L	M	-	M	L	H	-	H	H
Food Microbiology	U17ND1Y1	M	-	L	L	-	L	-	L	-	M	-	L	L
Food Microbiology & Food chemistry Practical	U17NDYP1	M	-	L	L	-	L	-	L	-	M	-	L	L
Human Physiology	U17ND202	H	H	H	M	H	L	L	L	H	H	H	H	L
Human Physiology Practical	U17ND2P2	H	H	H	M	H	L	L	L	H	H	H	H	L
Food Chemistry	U17ND2Y2	H	-	L	M	L	M	-	M	L	H	-	H	H
Food Microbiology & Food chemistry Practical	U17NDYP1	H	M	M	L	L	M	-	M	L	H	-	H	H
Food Sanitation and Hygiene	U17ND2S1	L	-	M	L	H	M	L	-	L	-	H	M	-
Principles of Nutrition	U17ND303	H	H	H	H	H	L	M	L	H	H	H	H	L
Principles of Nutrition Practical	U17ND3P3	H	H	H	H	H	L	M	L	H	H	H	H	L
Food Standard and Quality Control	U17FN3Y3	H	-	-	H	H	M	-	H	-	H	-	H	H
Food Standard and Quality Control &Nutritional Biochemistry Practical	U17NDYP2	H	-	-	H	H	M	-	H	-	H	-	H	H
NMEC-I Basics in Nutrition	U17ND4E1	H	H	-	H	-	M	H	H	H	H	H	H	L
Nutrition Through Life Cycle	U17ND404	H	H	H	H	H	H	H	H	H	H	H	H	L
Nutrition Through Life Cycle Practical	U17ND4P4	H	H	H	H	H	H	H	H	H	H	H	H	L

Nutritional Biochemistry	U17ND4Y4	**M**	**H**	**H**	**M**	**M**	**-**	**M**	**-**	**M**	**H**	**H**	**M**	**-**
Food Standard and Quality Control &Nutritional Biochemistry Practical	U17NDYP2	**H**	**-**	**-**	**H**	**H**	**M**	**-**	**H**	**-**	**H**	**-**	**H**	**H**
NMEC-II Die tin Health and Diseases	U17ND4E2	**-**	**M**	**L**	**M**	**M**	**M**	**M**	**-**	**-**	**H**	**H**	**M**	**L**
Dietetics–I	U17ND505	**M**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**M**
Community Nutrition	U17ND506	**-**	**M**	**M**	**-**	**M**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**L**
Dietetics–I Practical	U17ND5P5	**M**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**M**
Food processing / Functional Foods	U21ND5:1/ U21ND5:2	**H**	**H**	**M**	**H**	**H**	**H**	**L**	**H**	**M**	**L**	**H**	**H**	**H**
PRMID/Nutrition in special condition	U21ND5:3/ U21ND5:4	**L**	**-**	**-**	**-**	**L**	**-**	**-**	**L**	**-**	**-**	**M**	**-**	**-**
Diet and Counselling	U21ND5S2	**H**	**M**	**H**	**H**	**L**	**H**	**H**	**H**	**H**	**M**	**H**	**H**	**H**
Entrepreneurship Development	U21ND5S3	**H**	**M**	**L**	**L**	**-**	**-**	**-**	**-**	**L**	**-**	**L**	**L**	**-**
Dietetics –II	U17ND607	**L**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**
Fitness and Sports nutrition	U17ND608	**L**	**M**	**M**	**M**	**M**	**L**	**L**	**H**	**H**	**L**	**M**	**M**	**L**
Institutional Food Service management	U17ND69	**-**	**L**	**-**	**H**	**M**	**L**	**H**	**H**	**H**	**H**	**-**	**L**	**H**
Dietetics –II Practical & Dietary Internship	U17ND6P6	**L**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**
Food product development and marketing strategy	U17ND6:3	**H**	**M**	**L**	**H**	**L**	**H**	**L**	**L**	**M**	**L**	**M**	**L**	**H**
Project	U17ND6:2													

Course Type : Theory	Course Title : Food Science
Semester : I	Code : U17ND101
Credits : 4	Hours/Week : 4

1. Course Outcomes

After the completion of this course the students will be able to:

CO1 Identify, Define and classify different food groups, nutrients, and evaluate various pre-preparation and cooking techniques in order to adopt best practices for health and safety (K2).

CO2 Compare the composition and nutritive value of various nutrients present in cereals and pulse and also the effect of cooking and processing on cereals and pulses. (K4)

CO3 Elaborate the importance of fruits and vegetables in health and disease with special reference to the changes taking place on their nutritive value, palatability and texture during cooking and processing. (K5)

CO4 Evaluate the role of protein rich foods such as milk, egg, meat and fish and assess their perishability in order to formulate techniques to control the perish ability of the sea foods.

CO5 Analyze the role of Indian herbs as anti-oxidants and also assess the importance of various beverages, artificial sweeteners, sugar, fats and oils in health and disease (K4).

CO6 Develop various sustainable food practices like energy and nutrient conservation and food product development (k5).

2. Syllabus

UNIT-I Introduction to Food science (8 Hours)

Definition -Food Science, Food , Food dispersions- type and characteristics. Introduction to food science.-Definition , History, Its relation to quality control. Food dispersions- type and characteristics. Water- Types and Role of water in food . Carbohydrate Foods-Starch and sugar and Properties

Food groups - Basic five food groups, Nutritional classification of foods - energy yielding, body building and protective foods.

Methods of cooking - Their application in cookery . Effect of dry heat and moist heat Moist, dry and combination heat methods of cooking, Merits and demerits. Microwave cooking- principle, Merits & demerits. Other nutritive sweeteners

UNIT-II Cereals and Pulses (8 Hours)

A. Cereals - wheat and rice - structure, composition and Nutritive value - milling - by products of wheat and rice, parboiling - methods, advantages, Effect of cooking on the nutritive value of cereals, Gelatinization Dextrinization, gluten formation. Millets - Ragi, Bajra, Italian millet, Varagu,Samai-Composition, Nutritive value.

B. Pulses - Composition and Nutritive value, Germination, Effect of cooking on pulses, factors affecting cooking quality of pulses, role of pulses in cookery.

UNIT-III Vegetables and Fruits (12 Hours)

Vegetables -Classification, Composition and Nutritive value, Selection of vegetables Conservation of nutrients during cooking, role of vegetables in cookery, pigments in fruits and vegetables and effect of cooking on pigments.- pigments.- chlorophyll, carotenoids, anthocyanin, anthoxanthin.

Fruits- Classification, nutritive value, ripening of fruits, Effect of browning andits prevention , Storage of fruits.

UNIT-IV Milk and Meat Products (14 Hours)

Milk and Milk Products: Milk - composition and Nutritive value, physical properties of milk, Different types of milk and milk products, cheese, paneer and khoa role of milk and milk products in cookery. pasteurization of milk

Egg: Structure, composition and nutritive value, Qualitative determination of egg and its role in cookery, effect of cooking and factors affecting coagulation.

Meat: Classes of meat, Structure, composition and nutritive value of meat, cutting process of meat, methods of cooking and its effects Post mortem changes, ageing of meat, tenderising meat.

Poultry-classification composition and nutritive value, Principles and methods of cooking poultry. Selection methods poultry.

Fish -selection of fish, Structure, composition and nutritive value.

UNIT-V Fats, Sugar, Beverages and Spices (14 Hours)

Fat- Composition & nutritive value, Types of fats and oils, Hydrogenation, role of fat in cookery, effect of heating, factors affecting absorption of fats, smoking point Rancidity-Types, Prevention.

Sugar: Nutritive value, properties**,** Types of sugars, stages in sugar cookery, sugar and related 13 products. Crystallization, Factors affecting crystallization.

Spices: Functions, role of spices in cookery, Types, Nutritive value, Uses and abuses. Nuts & Oilseeds: Types, Composition Nutritive value, role of nuts and oil seeds in cookery.

Topics for Self-Study

1. Antioxidants in vegetables – Definition of antioxidants–relationship between free radicals and antioxidants - their role in boosting immunity .https://www.nccih.nih.gov/health/antioxidants-in-depth
2. Refining cooking oils – Process – advantages and disadvantages of refining oils – conventional oils vs. refined oils.
3. https://www.salonioil.com/refined-cooking-oil-their-dangerous-effects-on-health/
4. Comparison between sugar, jiggery and unrefined sugars. https://thewholetruthfoods.com/blog/sugar-honey-jaggery-which-is-healthier/
5. Genetically modified vegetables– advantages and disadvantages. https://www.gktoday.in/gk/advantages-and-disadvantages-of-genetically-modified-crops/

Text Books

1. Srilakshmi, B., "Food science",7th edition, New Age International Pvt. Ltd., New Delhi.,2018.
2. Potter, N.N. and Hotchkiss, H.J., "Food Science", 5th edition, CBS Publishers and Distributors, New Delhi, 2007.

Reference Books

1. Mudambi, R.S. and Rao. S. "Food Science", 2nd Edition, Wiley Eastern limited. New Delhi. 2007,
2. Mudambi, R.S. and Rajagopal, M.Y., "Fundamentals of Food, Nutrition and Diet Therapy" 5thEdition, Wiley Eastern Limited. New Delhi.,2010
3. Manay. N.S., "Foods – facts and principles", 3rd Edition, New Age International Pvt. Ltd. Publishers, New Delhi, 1996.
4. Swaminathan, M. "Food Science and Experimental Foods", Ganesh and Co., Chennai, 1988.
5. Bennion M and Hughes D (1975) Introductory foods Macmillan Publishing Co. Inc. New York.
6. Brich CG, Spencer M and Cancerron AG (1977) Food Science. Pergamon Press, New York.
7. Gopalan C, Ramasastri PN and Balasubramanian SC (1977) Nutritive value of Indian Foods. National Institute of Nutrition, Hyderabad.

Course Type : Core Practical	Course Title : Food Science Practical
Semester : I	Code : U17ND1P1
Credits : 2	Hours/Week : 3

1. Course Outcomes

CO1 Analyze the structure of starches microscopically and the changesthat take place during cooking of cereals and pulses (K4)

CO2 Evaluate the changes taking place in vegetable pigments during the application of heat, acid, and alkali (K5)

CO3 Compare enzymatic and non-enzymatic browning and analyze the changes taking place in both critically (K5)

CO4 Interpret the effect of cooking on proteins with special attention tomilk, meat and egg (K3)

CO5 Explain the various stages of sugar cookery and their role in food industry and the effect of heat on fats and oils (K2)

CO6 Formulate new food products, keeping the knowledge obtained through the study of food science (K6)

2. Syllabus

1. Introduction to Laboratory

Laboratory rules

Familiarizing with laboratory equipment, procedure, and learn to weigh food ingredients.

A Introduction to Food Science

B. Sensory evaluation techniques and their applications- Sensitivity

C. Technique in measurement of different food stuffs - use of standard measuring cups and spoons.

2. Cereals

Microscopic examination of various starches.

Preparation of modified starch and their application.

Estimation of Gluten formation.

Preparation of cereal products using rice, wheat, ragi based on steaming, absorption, pressure cooking and straining methods.

3. Pulses

Determination of Factors affecting cooking quality of pulses- use of hard water, soft water, sodium bi carbonate, vinegar; soaking and pressure cooking.

Preparation of few pulse recipes.

4. Vegetables and Fruits

Effect of acids, alkali, steaming and pressure cooking on the different pigments and acceptability of vegetables.

Effect of heat and pH on vegetable pigments like: chlorophyll, carotenoids, anthocyanin, anthoxanthin. Effect of cooking on flavouring compounds of vegetables.

Study of different methods of preventing enzymatic browning of cut fruits, pectin content of fruits. Preparation of vegetable and fruits recipes by using the above experiment.

5. Milk Cookery

Preparation of cheese, Paneer, Phirnee and Butter milk

6. Egg

Preparation of boiled egg, Scrambled egg, Poached egg, Omlette.

7. Sugar

Enumeration in Stages of sugar cookery

8. Fats and Oils

Estimation of Smoking temperature of different fats and oils.

Preparation of few deep fat food products.

9. Beverages

Preparation and taste evaluation

Coffee

Tea

Soup and

Few nourishing beverages (fruit and milk based).

Reference Books

1. Connie M.Weaver and James., "A Manual for Experimental Foods, Dietetics", 2nd Edition, CRC Press, New York, 2005.
2. Suzanne Nielsen.S., "Food Analysis laboratory Manual", 2nd Edition, Springer, 2015.
3. Potter, N.N. and Hotchkiss, J.H., "Food Science",5th Edition, CBS Publication, Wadsworth, 2007.

Text Book

1. Jamesen SK (1998) Food Science Laboratory Manual. Purdue University.

Course Type : Allied Theory	Course Title : Food Microbiology
Semester : I	Code : U17ND1Y1
Credits : 4	Hours/Week : 4

1. Course Outcomes

After the completion of this course the students will be able to:

CO1 Apply the concept of microbiology and use of microscope in identifying the microbes in foods (K4)

CO2 Assess the different types of microorganism involved in food spoilage and the conditions under which they will grow (K5)

CO3 Analyze the characteristics of food borne, waterborne and spoilage microorganisms, and methods for their isolation, detection and identification (k4)

CO4 Evaluate the role of microorganisms in fermentation and assess the benefits and adverse effects of fermentation (K5)

CO5 Determine the role and significance of microbial inactivation, adaptation and environmental factors on growth and response of microorganisms in various environments (K5)

CO6 Develop the knowledge on the effects of microorganisms in health and disease (K5)

2. Syllabus

UNIT- I Introduction to Food Microbiology (10 hours)

History and Development of Food Microbiology, , Definition and Scope of food microbiology. Microbiology - An introduction to microbial world: Bacteria, Fungi, Yeast, Viruses.

Contributions of Louis Pasteur - Fermentation - Pasteurization - Role of microbiologist in food industries-Scope of food microbiology. Light and Electron microscopy. Inter-relationship of microbiology with other sciences.

UNIT- II Characteristics of Microorganisms in Food (15 hours)

Microorganisms importance in food microbiology- Mold, Fungi, Algae, Bacteria and Virustheir morphology and structure, Significance of spores in food microbiology– general characteristics. Contamination of foods – green plants and fruits, animals, sewage, soil, water, air during handling and

processing. Spoilage – cause, classification, factors affecting kinds and numbers of microorganisms in food.

UNIT- III Microbial Food Spoilage (15 hours)

Microorganisms involved in spoilages of various foods: Milk, Bread, Canned food, Vegetables and fruits, Fruit juices, Meat, Eggs and Fish. Physical and chemical means used in destruction of microbes: Definition of sterilization and disinfection, Thermal- role of heat, pasteurization, Non-thermal- filtration and radiation in sterilization, use of chemical agents-alcohol, halogens and detergents

UNIT-IV Food Spoilage and Preservation (12 hours)

A. Definition, sources of contamination and Food preservation – Methods and principles of food preservation, delay of microbial decomposition, prevention of microbial decomposition, removal of micro-organisms.

B. Preservation by use of high temperatures – Factors affecting heat resistance of microorganisms, commercial heat preservation methods –sterilization, canning, pasteurization, blanching.

C. Preservation by use of low temperatures – Growth of microorganismsat low temperatures, low temperatures storage – cellar, chilling and frozen.

UNIT- V Illness of Microbes (18 hours)

A. Soil – Role of microorganism in nitrogen cycle, Water – bacteriological examination of water, water borne disease and their control, Sewage – Types of sewage, method of sewage disposal, Air – principles of air borne disease and their control

B. Food borne Illness – Food hazards, significance of food borne disease, incidence of food borne illness, risk factors associated with food borne illness. Bacterial agents of food borne illness – Clostridium botulinum, Escherichia coli, Salmonella, Shigella and Staphylococcus- The organism, pathogenesis and clinical features and association with foods.

Topic for Self Study

- Probiotics and prebiotics – difference - role of probiotics and prebiotics in gut health – natural and artificial probiotics.

  https://www.prebiotin.com/prebiotin-academy/what-are-prebiotics/prebiotics-vs-probiotics/

- Flavour changes in cheese due to the fermentation through various moluds https://www.cheesescience.org/microbes.html

- Canning – principle behind canning – puffing of can – maintenance of headspace in can – botulism and botulinum poisoning in canned foods. https://ir.library.oregonstate.edu/downloads/ft848t80r

Text Books

1) Adams, M.R., and Mosses, M.O., "Food Microbiology", 5th Edition, New Age International(P) Ltd., New Delhi, 2015.

2) Vijaya Ramesh,K, "Food Microbiology", MJP Publishers, Chennai, 2007.

Reference Books

1) Frazier William. C., and Westhoff, Dennis C., "Food Microbiology", TMH, New Delhi, 2004

2) Jay, James M. "Modern Food Microbiology", CBS Publication, New Delhi, 2000

3) Garbutt, J., "Essentials of Food Microbiology", Arnold, London, 1997.

4) Banwart.G.J., "Basic Food Microbiology", Chapman and Hall, NewYork,1991.

Course Type : Allied Practical - I	Course Title : Food Microbiology and Food Chemistry
Semester : I	Code : U17NDYP1
Credits : 2	Hours /Week : 3

1. Course Outcomes

After completion of this course the students will be able to:

CO1 Analyze the various staining methods to identify the microbes in foods. (K4)

CO2 Assess the role of microorganisms in fermentation. (K5)

CO3 Construct the role of microorganisms in food spoilage and their effects. (K5)

CO4 Evaluate the role of heat in cereals and structure and shape of various starch. (K5)

CO5 Explain the changes taking place in fats and oils on heating (K2)

CO6 Demonstrate the changes taking place in starch cookery and the structure of microorganisms in syneresis. (K5)

2. Syllabus

Food Microbiology **20 Hours**

1. Instrumentation in microbiology laboratory and their function. (microscope, autoclave& hot air oven)
2. Preparation of culture media.
3. Preparation of Pure culture techniques (Spread plate, Streak plate, pour plate methods)
4. Estimation of Staining technique - simple and differential.
5. Preparation of Microbiological evaluation of milk and milk products.
6. Isolation of spoilage organism from different food commodities.
7. Estimation of Microbiological analysis of water and air.

Food Chemistry **25 Hours**

Chemistry of Starch and Sugars

1) Gelatinization of starch,
2) Microscopic examination of uncooked and gelatinized starch
3) Estimation of Retro gradation and syneresis
4) Preparation of Gluten formation
5) Identification of Stages of sugar cookery
6) Preparation of fondant, Fudge, and Toffee
7) Preparation of Scum formation in milk.

Chemistry of Proteins

1) Effect of Soaking, germination and fermentation of pulses
2) Preparation of coagulation in egg white and egg yolk.
3) Preparation of Boiled egg, poached egg, omelet's, Custards, Cake and Mayonnaise.
4) Preparation of Coagulation and precipitation of milk proteins.
5) Preparation of cooking Meat, Fish and Poultry,
6) Testing the tenderness of meat by food thermometers

Chemistry of Fat and Oils

1) Estimation of Smoking temperature in different Fats.
2) Analysis of Factor affecting absorption of fat.
3) Effect of acids, alkali and heat on water soluble and fat-soluble pigments, Enzymatic browning and methods of prevention.

Reference Books

1. Bennion M. and Hughes D., "Introductory foods", Macmillan Publishing Co.Inc, New York, 1975
2. Brich, C.G., Spencer .M and Cancerron A.G. "Food Science", Pergamon Press, New York, 1977.
3. Dennis D Miller., "Food Chemistry", Wiley Inter Science Edition,1998.
4. Gopalan. C, Ramasastri.P.N., Balasuramanian S.C. "Nutritive value of Indian Foods", National Institute of Nutrition, Hyderabad, 1977.

Course Type : Theory	Course Title : HUMAN PHYSIOLOGY
Semester : II	Code : U17ND202
Credits : 6	Hours /Week : 6

1. Course Outcomes:

After the completion of this course the students will be able to:

CO1 Recollect the functions of basic units of the human system –cell (K3)

CO2 Explain the role of circulatory system in carrying the nutrients throughout the body and crucial role of heart and lungs in maintaining bodily functions. (K2)

CO3 Correlate the importance of various hormones present in the body and the deficiency and excess of each hormone (K5)

CO4 Analyze the role of digestive, excretory and nervous system in regulating the smooth functioning of the body. (K4)

CO5 Evaluate the role of sense organs and nervous, voluntary and involuntary control of various functions. (K5)

CO6 Develop competency in analyzing the correlation between health, disease and physiology. (K5)

2. Syllabus

UNIT – I Blood, Heart and Circulation 20 Hours

a) **Blood :** Composition, functions, RBC – Structure, functions, erythropoiesis, Haemoglobin, WBC –Structure, functions, Classification.

Blood Platelets: Structure, functions, Reticulo endothelia system, Blood groups –Rh factor. Blood coagulation, spleen –Structure and functions, Lymph – Lymphatic system.

b) **Heart and Circulation:** Heart – Anatomy and physiology, Blood vessels –Structure of artery, vein, capillaries, Cardiac output, Arterial Blood pressure, clinical measurement of blood pressure, properties of cordite muscle, origin and conduction of heart beat, cardiac cycle, Regulation of the Heart's action.

UNIT – II Respiratory and Excretory System 18 Hours

a) **Respiratory System:** Structure of respiratory organs, Mechanics of respiration, subdivisions of lung air, Chemistry of respiration. Artificial respiration, control of respiration.

b) **Excretory System -** Physiology of kidney – nephron, formation of urine, voiding of urine. Skin – Structure and functions, Regulations of body temperature.

UNIT – III Digestive System 15 Hours

a) General anatomy of digestive system – Digestive in the mouth, stomach and intestines, Movements of small intestine, Role of pancreas, Liver – Structure and function.

UNIT – IV Endocrine and Reproductive system 20 Hours

a) **Endocrinology -** Structure and functions of thyroid, pituitary, parathyroid, adrenals, islets of langerhansofpancreas, sex glands.

b) **Reproductive System -** General anatomy – Female and male reproductive system. Testis – Spermatogenesis, male sex hormones, ovaries – genesis, Female sex hormones, menstrual cycle. Phases and endocrine control. Mammary glands – Structure, lactation and process of reproduction, fertilization, development of embryo, pregnancy and parturition..

UNIT – V Nervous System and Special Senses 17 Hours

Nervous System

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.

Special Senses.

Physiology of vision, Structure of eye, dark and light adaptation, accommodation of the eye, visual fields, common due to abnormalities – presbyopia, cataract, Astigmatism, Blindness.

Ear – Structure and Physiology of hearing.

Topic for Self Study

- Immunity – innate and acquired immunity.https://www.creative-diagnostics.com/innate-and-adaptive-immunity.
- Heart lung machine.https://www.youtube.com/watch?v=RmwMzw_YTNU
- Renal failure –Kidney transplantation and artificial kidney dialysis and home remedies of detoxification diet,.https://www.healthline.com /health/dialysis#risks
- Neurotransmitters – dopamine, serotonin, endorphins, oxytocin. https://www.healthline.com/health/happy-hormone#food

Text Books

1. Guyton A.C., "Human Physiology and Mechanism and Disease", 13thEdition, Elseivier., 2015 .
2. Sembulingam, K., "Essentials of Medical Physiology",6th Edition, Jaypee Brothers Medical Publishers (P) Ltd., New Delhi, 2012.

Reference Books

1. Best and Taylor, "The Physiological Basis of Medical Practice", 13th Edition, Saunders Company, (2011)
2. Chaudhri, K.,"Concise Medical Physiology", 7th Edition, New Central Book Agency (Parentral) Ltd., Calcutta, (2016).
3. Chatterjee C.C., "Human Physiology, Volume I & II", 11th Edition, CBS Publishers, 2017.

Course Type : CORE PRACTICAL	Course Title : HUMAN PHYSIOLOGY PRACTICAL
Semester : II	Code : U17ND2P2
Credits : 2	Hours /Week : 3

1. Course Outcomes

After the completion of this course the students will be able to:

CO1 Identify the structure of various tissues microscopically (K2)

CO2 Analyze blood groups and differentiate the various blood groups (K4)

CO3 Apply the various instrument like stethoscope and sphygmomanometer (K3)

CO4 Estimate the amount of hemoglobin in blood (K4)

CO5 Correlate the use of various equipment in the evaluation of normal body functions (K5)

CO6 Compare the various organs and it's functions (K5)

2. Syllabus

Human Physiology

1 Histology of the epithelial, muscular, connective tissue.

2. Microscopic structure of bone and cartilage, ovary, uterus, mammary glands and testis.

3. Microscopic structure of nerve ,endocrine glands- thyroid, pituitary and adrenal.

4. Estimation of Haemoglobin, RBC and WBC count Demonstration.

5. Identification of different types of white blood cells – Demonstration.

6. Determination of blood groups.

7. Estimation of hemoglobin- Sahli's Acid hematin method

8. Preparation and examination of stained blood smear (Wedge or glass slide method).

9. Determination of Erythrocyte Sedimentation Rate (Wintrobe method).

10. Effect of temperature on heart beat – demonstration.

11. Arterial blood pressure and pulse rate, effect of exercise.

12. Histology of artery, vein, trachea and lung.
13. Separation of blood components (Centrifugation).
14. Determination of bleeding time (Duke method) and coagulation time (Capillary tube method).

Related Experiences

1. Visit to blood bank.
2. Observation of blood transfusion.
3. Arterial blood pressure and pulse rate, effect of exercise.
4. Histology of artery, vein, trachea and lung.

Reference Books

1. Clark Patrica., "Human Physiology Lab Manuel Study Guide", Second Edition, Pat Clark., India.
2. Bestand Taylor, "The Physiology Basis For Medical Practice", Saunders Company, 1992.

Course Type : ALLIED COURSE	Course Title : FOOD CHEMISTRY
Semester : II	Code : U17ND2Y2
Credits : 4	Hours /Week : 4

1. Course outcomes

After completion of this course the students will be able to:

CO1 Discuss the importance of knowing the chemical bonds and the properties of foods (K2)

CO2 Explain the chemical changes takes place in starches (K2)

CO3 Acquire knowledge on the concept of cooking of fats and absorption of fats in deep fried foods (K4)

CO4 Analyze the effect of soaking and germination of pulses and its advantages to our body (K4)

CO5 Interpret the changes takes place in vegetable and animal protein while cooking. (K4)

CO6 Analyze the plant pigments and its estimation methods (K4)

2. Food Micrbiology

UNIT – I Introduction to Food Chemistry (12 Hours)

Definition of food chemistry, properties of foods physical properties – solution, vapour pressure, boiling point, freezing point ,osmotic pressure, viscosity, surface and interfacial tension, specific gravity , Acids, bases and buffers-acids and bases in foods , buffers ,The chemical bond ionic bond, covalent bond, hydrogen bond Colloids –sols, gels, emulsions, foams.

Chemical Properties of Food : Moisture in food, Hydrogen Bonding, Bound water, Water activity foods, Determination of moisture content in food.

UNIT- II Chemistry of Carbohydrates and Sugar (12 Hours)

Carbohydrates - classification of carbohydrates-hemi cellulose, pectin, gel formation, changes of carbohydrates on cooking –solubility, hydrolysis, gelatinization, browning reaction. Components of starch, Swelling of starch granules, Gel formation, Retro gradation, Syneresis.

Sugar- Stages of sugar, Acid, Alkali, Fat and surface-Active agents on starch.

UNIT- III Chemistry of Proteins (12 Hours)

Components of wheat protein, Structure, Gluten Formation Effect of soaking, Germination on Pulse proteins, properties of Egg Protein, Chemistry of Milk Protein, Changes in milk, Egg and Meat protein during Heating. Action of heat, Acid, Alkalis on Vegetables Proteins and Animal Proteins. classification of Protein-native and denatured protein, heat treatment of protein, pure protein -whey Protein , colostrums

UNIT- IV Chemistry of Fat and Oils (12 Hours)

Introduction, occurrence, composition, classification of glycosides, structure, Physical Properties-Melting point, softening point, slipping point, smoke, flash, fire points, short, and chemical properties of fats and oils- rancidity and flavor, reversion processing of oil-bearing materials, refining of oils and fats, splitting & esterification hydrogenation, shortenings and low-fat spreads.

UNIT- V Chemistry of Pectic Substances, Plant Pigments, Spices and Condiments (12 Hours)

Pectins, Phenolic Components, Enzymatic browning in Fruits and vegetables.

Volatile compounds from cooked vegetables, Estimation of different types of plant pigments – Water- and fat-soluble pigments Such as Chlorophylls.

Properties and active principles of spices and condiments.

Topics for Self-Study

- Relationship between moisture content of food and microbial spoilage.https://www.fda.gov/inspections-compliance-enforcement-and-criminal-investigations/inspection-technical-guides/water-activity-aw-foods
- Postharvest changes and storage of fruits and vegetables. http://www.fao.org/3/y4358e/y4358e05.htm
- Prevention of rancidity in oils – addition of antioxidants. https://en.wikipedia.org/wiki/Rancidification#:~:text=Antioxidants%20are%20often%20used%20as,and%20tocopherols%20(vitamin%20E).
- Role of non-enzymatic browning in food industry. https://en.wikipedia.org/wiki/Food_browning

Text Books

1. Shakuntala Manay, Shadaksharaswamy, M. “Foods, Facts and Principles”, 2nd Edition, New Age International Pvt Ltd Publishers, (2017) .
2. Chandrasekhar, U. “Food Science and applications in Indian Cookery”, Phoenix Publishing House, New Delhi
3. Swaminathan, M. Food Science, “Chemistry and Experimental Foods”, Bappco Publishers, Bangalore, (2015).

Reference Books

1. Meyer, L.H, "Food Chemistry", (2004) CBS Publishers and Distributors, 4th edition

2. Paul, P.C. and Palmer, H.H. "Food Theory and Applications", John Wiley and Sons, New York, (Revised Edition)(2002)

3. Chopra H.K, Panesar, P.S, "Food Chemistry", Narosa Publishing House, New Delhi, (2010).

Course Type : Allied Practical	Course Title : Food Microbiology and Food Chemistry Practical
Semester : II	Code : U17NDYP1
Credits : 3	Hours / Week : 3

1. Course Outcomes

After completion of this course the students will be able to:

CO1 Classify the various staining methods to identify the microbes in foods. (K3)

CO2 Assess the role of microorganisms in fermentation (K4)

CO3 Explain the role of microorganisms in food spoilage and their effects. (K4)

CO4 Evaluate the role of heat in cereals and structure and shape of various starch (K5)

CO5 Demonstrate the changes taking place in fats and oils on heating (K5)

CO6 Compare the changes in sugar during various temperatures (K5)

2. Food Micrbiology

1. Instrumentation in microbiology laboratory and their function. (microscope, autoclave& hot air oven)
2. Preparation of culture media.
3. Estimation of Pure culture techniques (Spread plate, Streak plate, pour plate methods)
4. Preparation of staining technique simple and differential method.
5. Estimation of Microbiological evaluation of milk and milk products.
6. Isolation of spoilage organism from different food commodities.

Food Chemistry

Chemistry of Starch and Sugars

1) Estimation of Gelatinization of starch
2) Microscopic examination of uncooked and gelatinized starch
3) Determination of Retro gradation and syneresis ,
4) Preparation of Gluten formation,

5) Estimation of Stages of sugar cookery ,

6) Preparation of fondant, Fudge, and Toffee, Scum formation in milk.

Chemistry of Proteins

1) Effect of Soaking, germination and fermentation of pulses

2) Determination of coagulation of egg white and egg yolk.

3) Preparation of Boiled egg, poached egg, omelettes, Custards, Cake and Mayonnaise.

4) Preparation of Coagulation and precipitation of milk proteins.

5) Changes observed in cooking Meat, Fish and Poultry, Testing the tenderness of meat.

Chemistry of Fat and Oils

1) Estimation of Smoking temperature of different Fats, Factors affecting absorption of fats .

Chemistry of Plant Pigments

1) Effect of acids, alkali and heat on water soluble and fat soluble pigments Enzymatic browning and methods of prevention.

References Books

1. Denis D Miller., "Food chemistry a laboratory Manual", John Wiley Nasher, New York.
2. James G. Cappuccino and Natalie Shermen, "Microbiology- A laboratory Manual", Pearson Education Publishers, USA, 2008.
3. Fennema, Owen.R., "Food Chemistry", 3rd Edition, Marcell Dekker, New York, 1996.

Course Type : SBEC -I	Course Title : Food Sanitation and Hygiene
Semester : II	Code : U21ND2S1
Credits : 2	Hours / Week : 2

1. Course Outcomes:

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

CO1 Analyze the importance of food safety in the processing industry (K4)

CO2 Compare the effects of various contaminations (K4)

CO3 Evaluate the various food safety programs (K5)

CO4 Analyze various hazard analysis techniques and differentiate biological and chemical hazards. (K4)

CO5 Develop knowledge on various sanitation and hygiene programs. (K3)

CO6 Perceive overall idea about food safety regulation in India. (K5)

Unit – I Sanitation Overview Sanitary Regulations (6 hours)

Definition, Types of Hygiene and sanitation, Management of Sanitation, Microorganisms and Their Relationship to Sanitation Food Contamination sources. Hazard Analysis and Critical Control Points (HACCP)

Unit – II Cleaning Agents (6 hours)

Classification of Cleaning Equipments, Functioning and care of Manualleaning Equipment Functioning and care of Mechanical Cleaning Equipment, Groups of Cleaning agents, Use of Detergents, Use of after, Abrasives, degreasers acids, organic solvents and dry-cleaning agents.

Unit-III Food Storage Sanitation (6 hours)

Food Transport Sanitation, Pest Control, Packaging Sanitation, Waste Product Disposal

Unit - IV Water & Air (6 hours)

Sources of water and hazards of water pollution, Sources of air Pollution health effects of air pollution, Pollution Control ,Water borne diseases, air borne diseases preventing measure for diseases.

Unit - V Handling of Food (6 hours)

Personal hygiene of the food handlers • Program of Good Health For Food handlers • Food Borne Diseases – Roots of Contamination • safety measures for food service personnel. • Care maintenance of Protective Clothing .

Self Study

1. Natural food toxins -https://www.who.int/news-room/fact-sheets/detail/natural-toxins-in-food
2. Fumonisins - https://www.who.int/foodsafety/FSDigest_Fumonisins_EN.pdf?ua=1&ua=1
3. Food safety events - https://www.who.int/foodsafety/areas_work/infosan/INFOSAN-QS3/en/
4. Nutrition and food security - https://www.who.int/foodsafety/areas_work/nutrition/en/

Reference Books

1. Norman G. Marriott, "Principles of Food Sanitation", 6th edition,1996
2. John A. Troller, "Sanitation in Food Processing", Academic Press
3. Peleezar, M.I. and Reid, K. D., "Microbiology", McGraw Hill Company, New York,1978.
4. Benson Harold, J., "Microbiological Application", Publishers, U.S.A.,1990
5. Colling, C.E. and Lyne, P.M., "Microbiological Methods", Butterworth. Lon, 1976

Course Type : CORE THEORY	Course Title : PRINCIPLES OF NUTRITION
Semester : III	Code : U17ND303
Credits : 5	Hours / Week : 6

1. Course Outcomes:

At the Completion of the Course, the Students Will be Able to:

CO1 Identify macro and micronutrient and learn to critically evaluate the methodology and derivation of requirements for specific macro and micro nutrients. (K2)

CO2 Explain the recommended dietary allowances in different age groups. (K2)

CO3 Discuss the various components of foods with regards to carbohydrates, proteins and fats. (K4)

CO4 Compare and correlate various diseases caused due to the excess and deficiency of nutrients. (K5)

CO5 Perceive with clarity, the role of micro nutrients including various vitamins and minerals in the normal functioning of the body and identify the deficiency diseases. (K5)

CO6 Evaluate the best nutrition based services for students and ultimately the entire society. (K5)

2. Syllabus:

UNIT I **20 Hours**

a) Recommended dietary allowances – Definition, General principles of deriving RDA, Factors affecting RDA, Methods used for deriving RDA.

b) Carbohydrates – Definition, Nutritional classification, Functions, Digestion and absorption, Requirements and Sources.

c) Disorders- Diabetes mellitus – causes, symptoms, types of diabetes, principles of diet, preventing measures of diabetes mellitus, hormones involved in diabetes mellitus.

d) Dietary Fibre – Definition, Classification, Sources and Role of Fibre in human Nutrition.

UNIT II **20 Hours**

a) Energy – Definitions, units of Energy, Determination of energy value of foods, Bomp Calorimeter, Types of calorimeter- Direct and Indirect calorimeter and Thermal effect of food.

b) BMR – Definitions, Determinations, Factors affecting the BMR, Specific dynamic action, Energy requirement and sources.

UNIT III **20 Hours**

a) Proteins – Definition, Nutritional classification of protein , Functions of Proteins, Digestion and absorption Sources and Requirements. Deficiency Disorder- PEM, Amino acids- Essential and non-essential Evaluation of Protein quality – PER, BV, NPU and chemical score.

b) Lipids – Definition, Nutritional classification, Functions, Digestion and absorption, Sources and requirements, Deficiency disorder – diseases related to heart

UNIT IV **15 Hours**

a) Vitamins – Classification, functions and Deficiency, Fat Soluble Vitamins – Vitamin A, D, E and K – Functions, Requirements, Sources and Effect of deficiency.

b) Water soluble vitamins – Thiamine, Riboflavin, Niacin, Ascorbic acid, Folic acid, Vitamin B6 and B12 – Functions, Requirements, Sources and Effects of deficiency

UNIT V **15 Hours**

a) Minerals – Classification and General Functions. (B) Macro minerals – Calcium, Phosphorus, Magnesium, Sodium and Potassium – Functions, Requirements, Sources, Effects of Deficiency, Effect of imbalance of Sodium and Potassium.

b) Micro Minerals – Iron, Iodine, Copper, Fluorine and Zinc – Functions, Requirements, Sources and Effect of Deficiency..

Topics for Self-Study

- Fiber present in fenugreek and flaxeed – effect of flaxseed and fenugreek in reducing blood sugar and cholesterol level.

  https://www.healthline.com/health/type-2-diabetes/fenugreek-blood-sugar#potential-risks.

  https://www.healthline.com/nutrition/ flaxseed-for-diabetes

- Vitamin C and vitamin D as immunity boosters. https://medicaldialogues.in/diet-nutrition/news/vitamin-c-vitamin- d-supplements-may-boost-immune-system-to-fight-covid-19-65125

- Effect of potassium rich foods in prevention of hypertension. https://www.cdc.gov/salt/potassium.htm

Text Books

1. Swaminathan, M., "Essentials of Food and Nutrition", Vol I & II, Bappco Publishers, Madras 2000.
2. Srilakshmi. B., "Nutrition Science", New Age International (p) Ltd, Publishers, 2004.

Reference Books

1. Frances sizer and Ellie Whitney, "Nutrition Concepts and Controversies", Thomson Wadsworth Publisher, New York, 2006.
2. Mangale Kango, "Normal Nutrition, Curing Diseases through Diet", 1st Edition, CBS publication, 2005.
3. Bonnie, Worthington – Roberts and Sue Rodwell Williams, "Nutrition throughout the lifecycle", 3rd edition, WCB/MC Graw Hill Publisher, New York, 1996.
4. Paul. S., "Text of Bio Nutrition Fundamental and Management", RBSA Publishers, 2003

Course Type : CORE PRACTICAL	Course Title : PRINCIPLES OF NUTRITION PRACTICAL
Semester : III	Code : U17ND3P3
Credits : 2	Total Hours : 3

Course Outcomes

At the completion of the course, the students will be able to:

CO1 Obtain in-depth knowledge on the structure of nutritional components. (K2)

CO2 Differentiate the various components of carbohydrates and proteins using qualitative tests. (K4)

CO3 Analyze quantitatively the carbohydrates, proteins and fats present in various food stuff. (K4)

CO4 Evaluate the various components of protein metabolism such as nitrogen in the food stuff. (K5)

CO5 Estimate the quantity of crude fiber present in various foods. (K5)

CO6 Analyze the composition of foods with regards to its nutrient composition. (K4)

Qualitative Analysis

1. Qualitative test for Carbohydrate – Glucose, Fructose, Lactose, Maltose and Galactose.
2. Qualitative test for Protein.
3. Qualitative estimation of iron, Ascorbic acid Vitamin A.
4. Demonstration of estimation of nitrogen.
5. Demonstration of fiber estimation.
6. Demonstration of total fat estimation.

Text Books

1. Varley, H., Gowenlak, A.H. and Hill, M. "Practical Clinical Biochemistry", William Itinmaon Medical Books, London, 2000.

2. Oser, B.L., "Harke's Physiological Chemistry",15th Edition, Tata McGraw Hill Publishing Company Ltd., Bombay, 2001.

Reference Books

1. Sadasivam, S. and Manickam, "A. Biochemical Method", Second Edition, New Age International P. Ltd., Publishers, New Delhi, 2003.

2. Raghuramulu, N., Madhavannair, K. and Kalyana Sundaram, National Institute of Nutrition, "A Manual of Laboratory Techniques", Hyderabad, 500007, 2013.

3. Practical Organic Chemistry by R. Plimmer - Longmans

4. Practical Biochemistry by Keith Wilson, John M Walker (Paperback). 2000

5. Scientific Foundations of Clinical Biochemistry: Biochemistry in Clinical Practice v.2: Amazon.co.uk: David L. Williams, Vincent Marks: Books.

Course Type : ALLIED THEORY	Course Title : FOOD STANDARD AND QUALITY CONTROL
Semester : III	Code : U17ND3Y3
Credits : 4	Hours / Week : 4

Course Outcomes

After the Completion of this Course the Students will be able to:

CO1 Identify and apply the various quality control measures involved in the food industry. (K2)

CO2 Evaluate critically the role of food specification and the importance of reading food label. (K4)

CO3 Analyze the effect of food additives and preservatives in processed foods. (K4)

CO4 Apply the role of sensory evaluation in the quality assessment of food products. (K4)

CO5 Interpret the effects of food adulterants and experimentally identify common food adulterants and also the effects of naturally occurring toxins in foods. (K5)

CO6 Analyze various food laws in detail and their day-to-day application. (K4)

Syllabus:

Unit I **12 Hours**

Food quality ,quality features of food, quality checking of raw materials and processed food ,simple technique of quality checking of raw food materials – cereals ,pulses, vegetables, fruits , milk and meat products, oils and spices and condiments, processed foods- tinned foods ,baked food, advantages of quality control and stages of quality control.

Unit-II Quality Control Measures **12 Hours**

(a) Food specifications:- Food specifications for various food products- starchy food , milk and milk products, fruit products , beverages , spices and condiments , oils and fats; objectives and advantages .

(b) Food Additives & their specifications:- Classifications of food additives, usages and optimal level recommended for usage as specifications - Food colors , leavening agents , preservatives.

UNIT III Quality Evaluation of food 12 Hours

(a) Subjective evaluation: Sensory characters of food, organs involved in assessment – physiological process, types of sensory test- requirements to contact sensory evaluation, Role and purpose and defects in sensory evaluation- panel member, essential qualities of a panel member, procedure of sensory evaluation, popular centres for sensory evaluation in India and their role.

(b) Objective Evaluation: Objectives, requirements, different test, and instruments used for objective valuation, advantages and limitations, popular centre in India.

Unit-IV Food Contaminates and Adulterants 12 Hours

(a) Food toxins – Mycotoxins – aflatoxins, aspergills and penicillium species, Mushroom poisoning, sea food toxins.

(b) Other toxins - Naturally occurring in foods, Lathyrogens, haemoagglitunins, goitrogens

(c) Toxic minerals and other inorganic components in food and water: sellinium, Fluorine, nitrates and nitrites ,oxalate and phytates.

(d) Food adulterations and food standards : adulterations- Definition, common food adulterants : Test for detecting food adulterants, contamination with toxic minerals, pesticides and insecticides : Effects of food adulterants and contamination, measures to control food adulterants .Prevention of food adulterants act

Unit –V Food Standards and Food Laws 12 hours

(a) international food standard and Codex Alimentarious

(b) AGMARK & BIS

(c) FSSAI

(d) HACCP

Topic for Self Study

- Adverse effects of excessive food colourants.

  https://www.newdelhitimes.com/adverse-effects-of-artificial-food-dyes123/

- Case studies from food industry regarding mishandling of food additives.

  https://www.intechopen.com/books/nutrition-in-health-and-disease-our-challenges-now-and-forthcoming-time/food-additives-in-food-products-a-case-study

- Role of sensory evaluation in coffee and tea industry.

  https://www.alpha-mos.com/coffee-tea

- Safety standards to be followed in food processing units.

  https://www.ag.ndsu.edu/foodlaw/processingsector/rules-and-standards-for-food-processing

Text Books

1. Srilakshmi, B., "Food science" ,7th edition, New Age International Pvt. Ltd., New Delhi., 2018.
2. Potter, N.N. and Hotchkiss, H.J., "Food Science", 5th edition, CBS Publishers and Distributors, New Delhi, 2007.

References Books

1. Edward G. Schilling., "Acceptance Sampling in Quality control", 2nd Edition, CRC Press, Mallbook., 1996
2. Swaminathan.M., "Essential of Food and Nutrition", New Age Publication, New Delhi.2011
3. Eillian H. Meyer, "Food Chemistry", Affiliated West Press Pvt.,Ltd, New Delhi,1973.

Course Type : ALLIED PRACTICAL -II	Course Title : FOOD STANDARD AND QUALITY CONTROL AND NUTRITIONAL BIOCHEMISTRY PRACTICAL
Semester : III	Code : U17NDYP2
Credits : 3	Hours / Week : 3

1. Course Outcomes

After the Completion of this Course the Students will be able to:

CO1 Interpret label and identify various preservatives and additives present in foods. (K4)

CO2 Perform simple techniques of identifying food adulterants. (K4)

CO3 Evaluate foods subjectively. (K4)

CO4 Identify presence of sugar and protein in urine. (K2)

CO5 Estimate the quantity of glucose present in blood. (K4)

CO6 Estimate the cholesterol content of blood. (K4)

2. Syllabus

Qualitative Analysis of Urine and Blood.

1. Quantitative analysis of Urine sugar, protein, Bile pigments, Bile Salts
2. Estimation of Glucose in Urine(Benedict's Method)
3. Estimation of Urea in Urine (DAM Method)
4. Estimation of Blood Glucose (Folin-WU Method)
5. Estimation of Blood Urea (DAM Method)
6. Estimation of serum cholesterol (Zak's Method)
7. Urine analysis - normal & abnormal constituents of urine.
8. Routine urine analysis-Biochemical (using multi sticks) and Microscopic examination of urine (demonstration)
9. Determination of pH of biological samples - blood, urine, saliva, plasma (demonstration)

II Food Standard and Quality Control Practical

Display the standard food products available in the market.

III Food Adulterants

Physical and chemical method of identifying common food adulterants.

IV SE Common Foods

Sensory Evaluation of common foods by using five point Hedonic scale.

Reference Books

1. Inteaz Alli., "Food Quality Assurances, Principles and Practices", CRC press, India.
2. Margaret M.C. Williams, "Food Fundamentals", John Wiley and Sons, London,1974.
3. Conn EE and Stump PK (1981) Outlines of Biochemistry. Wiley Eastern (P) Ltd., New Delhi.
4. Linder MC (1991) Nutritional Biochemistry and Metabolism: with clinical applications. Second Edition, Appleton and Lange.
5. Plummer DT (1996) An introduction to Practical Biochemistry. Tata McGraw Hill, New Delhi.

Course Type : NMEC-I	Course Title : BASICS IN NUTRITION
Semester : III	Code : U17ND3E1
Credits : 2	Hours /Week : 2

Course Outcomes

After the Completion of this Course the Students will be able to:

CO1 Correlate the role of food and its importance in disease prevention. (K3)

CO2 Compares the basic components present in food and the recommended allowance of each and every component. (K4)

CO3 Classify the macronutrients in foods and their vital role in energy giving and body building functions. (K4)

CO4 Analyze the micro and macronutrient deficiencies and the role of food in preventing them. (K4)

CO5 Acquire basic knowledge in the treatment of diseases through diet. (K4)

CO6 Appreciate the importance of good food habits in leading a healthy lifestyle.

Syllabus

Unit-I Food (6 Hours)

Food definition, classification of food, basic five food groups classification of nutrients, RDA- reference man and women, factors influencing RDA

Unit-II Carbohydrates (6 Hours)

Carbohydrates: functions, sources, classifications and requirements, disorder of CHO- under nutrition and obesity and Diabetes mellitus, Role of dietary fibre in health and disease.

Unit-III Proteins (6 Hours)

Definition of protein, Sources, functions of proteins, nutritional classifications of amino acids and its requirements, deficiency of protein metabolism- PEM, PCM.

Unit-IV Lipids **(6 Hours)**

Lipids - sources, functions of protein classifications and types of fatty acids and requirements, disorder of lipid metabolism- disease related to heart-hypertension and atherosclerosis.

Unit - V Macro Minerals & Vitamins **(6 Hours)**

A. **Macro Minerals**: sources, functions. Classifications, Requirements of macro minerals and effect of deficiency and excess.

B. **Micro Minerals:** sources, functions. Classifications, Requirements of iron, Iodine Zinc and flourine effect of deficiency and excess.

Vitamins

A. Fat soluble Vitamins: Vitamin A, Vitamin D, E & K. Functions, Sources, Requirements and Deficiency diseases.

B. Water soluble vitamins: Thiamine, Riboflavin, Niacin, Pantothenic acid, Biotin, Folic acid, Vitamin B12, VitaminB6 and Vitamin C, Functions, Sources , Requirements and Deficiency diseases.

Topics for Self-Study

- Life style modification in prevention of diseases. https://www.health.harvard.edu/newsletter_article/Lifestyle_prevention_Does_it_work_And_why
- Food labels and their importance. http://www.amzbolt.com/blog/Importance-of-checking-food-label/index.aspx
- Hazards of junk food. https://www.icicilombard.com/blog/health-insurance/hi/5-harmful-effects-of-junk-food
- Role of vegetables in boosting immunity. https://www.onhealth.com/content/1/immune_system_boosting_foods

Books

1. Srilakshmi, B., "Food science" , 7th edition, New Age International Pvt. Ltd., New Delhi., 2018.
2. "Dietary Guidelines for Indians", ICMR, National Institute of Nutrition, Hyderabad, 2013.

Course Type : CORE THEORY	Course Title : NUTRITION THROUGH LIFECYCLE
Semester : IV	Code : U17ND404
Credits : 6	Hours /Week : 6

1. Course Outcomes :

After Completion of the Course, Students will be able to:

CO1 Study the relationship between nutrition and health (K2)

CO2 Obtain knowledge on the nutritional needs pertaining to different stages of life (K2)

CO3 Compare the physiological changes on various stages of life and coping up with their daily dietary requirements (K5)

CO4 Evaluate the changes during various stages of growth and development throughout life cycle. (K5)

CO5 Estimate the nutritional requirements throughout life cycle. (K5)

CO6 Plan and execute a diet for all stages of life and health conditions (K5)

2. Syllabus

UNIT – I Meal Planning & Pregnancy 20 Hours

a. Basics principles of meal planning, RDA , Food allowance for different age groups, factors influencing nutritional requirements for all age groups.

b. Nutrition during Pregnancy- stages of pregnancy, physiologicalchanges, Weight gain in pregnancy, Complications, factors influencing the outcome of pregnancy, nutritional requirements and diet planning for pregnant women.

UNIT – II Nutrition in Lactation 15 Hours

Nutrition for lactating women- physiology and psychology of lactation, hormonal control, colostrums- composition, composition of breast milk, Factors affecting the volume and composition of breast milk, nutritional requirements of a nursing mother, diet planning, factors responsible for the lactating failure.

UNIT – III Nutrition in Infancy 20 Hours

a. Nutrition in infancy- birth weight of infants, rate of growth, milestones in development (only stage) immunization schedule, nutritional requirements, process of breast feeding, comparison of human milk with cow's milk, artificial feeding, weaning and supplementary foods, feeding problems.

b. Nutrition in pre- school age- growth and development, nutritional requirements, factors affecting nutritional status, food requirement, low cost supplementary foods, nutrition related problems in childhood, diet planning for the pre- school child.

UNIT- IV Nutrition in School Age and Adolescence 20 Hours

a. Nutrition in school age children – growth in school children, nutritional and food requirement, packed lunch- factors to be considered, sample menu for the school children.

b. Nutrition in adolescence – growth and development, body composition, puberty, secondary sexual characteristics, psychological changes, nutritional requirements, nutritional problems, malnutrition due to early marriage, food habits and diet plan.

UNIT- V Nutrition in Adulthood in Elderly 15 Hours

a. Nutrition in adulthood – reference men and reference women, nutritional requirements of an adult man and women, body composition, nutrition and health issues, planning diet to suit different income levels.

b. Nutrition in elderly – definitions of geriatrics, changes in body composition, physiological changes, psychological and socio economic factors in relation to food intake, nutritional requirement, modification of diet in old age.

Topics for Self-Study

- Effects of alcohol and smoking on pregnancy.
  https://share.upmc.com/2016/03/how-smoking-alcohol-drugs-harm-your-baby/
- Myths and realities regarding lactation.
  https://www.chla.org/blog/rn-remedies/ten-myths-and-facts-about-breastfeeding
- Feeding pre-term infants.
  https://www.who.int/elena/titles/feeding_vlbw_infants/en/
- Traditional food practices that are followed during puberty in girls and its significance.
  https://www.prb.org/nutritionofwomenandadolescentgirlswhyitmatters/

Text Books

1. Mahtab, S, Banarji, Kamala Krishnasamy, G.N.V. Brahmam, "Text book of Human Nutrition", Third Edition, Oxford and IBH Publishing Co. P. Lit., New Delhi, 2012.

2. Srilakshmi, B., "Dietetics", Sixth Edition, New Age International (P) Ltd., New Delhi,2013.

Reference Books

1. "Dietary Guidelines for Indians", ICMR, National Institute of Nutrition, Hyderabad, 2013.

2. Gobalan,C. Rama Sastri B.V. andBalasubramanian, "Nutritive value of Indian Foods", NIN, ICMR, Hydrabad,2014.

3. Krause, M.V and Hunscher, M.A., "Food, Nutrition and Diet Therapy",14th Edition, W.B.Saunders. 2014

Course Type : CORE PRACTICAL	Course Title : NUTRITION THROUGH LIFECYCLE PRACTICAL
Semester : IV	Code : U17ND4P4
Credits : 2	Hours /Week : 3

1. Course Outcomes

After Completion of the Course, Students will be able to:

CO1 Estimate the critical nutritional factors that contribute to healthy growth, development and functional capacity throughout life. (K4)

CO2 Apply a variety of dietary assessment methods and describe the various measurements employed to monitor nutritional status at different life stages. (K3)

CO3 Plan a nutritional requirements of women before and during pregnancy and lactation, discuss strategies to overcome nutrition- related problems. (K5)

CO4 Integrate the physiological, cultural and behavioural factors that determine nutrition requirements from infancy to adulthood. (K5)

CO5 Describe conditions associated with ageing and their nutritional implications, discuss successful dietary interventions to stabilize physiological decline and enhance physical and mental resilience. (K4)

CO6 Support practical session equips one with the knowledge and skills to handle an emergency situation. (K5)

2. Syllabus

Menu planning

1. Planning, Preparing and Serving a Meal for

a. Expectant women

b. Lactating women

c. Infancy

d. Pre-School children

e. School going children

f. Adolescent

g. Adult

h. Old age person

Course Type : ALLIED COURSE	Course Title : NUTRITIONAL BIOCHEMISTRY
Semester : IV	Code : U17ND4Y4
Credits : 3	Hours / Week : 4

Course Outcomes

After Completion of this Course the Students will be able to:

CO1 Obtain an in-depth understanding on the functioning of cells. (K2)

CO2 Correlate various metabolic pathways with thorough understandingof their interrelationship. (K4)

CO3 Evaluate the effects of the essential aminoacids and their role in carbohydrate metabolism and vitamin synthesis. (K5)

CO4 Analyse the effect of metabolism on various disorders. (K4)

CO5 Interpret the role of nucleic acids and the role of DNA and RNA. (K5)

CO6 Interpret the fate of food in the body in both health and disease (K5)

Syllabus

UNIT-I Introduction (14 Hours)

Definition, objectives, scope and inter relationship between biochemistry and other biological science.

Enzymes: Definition - types - classification - specificity - Isozymes - Coenzymes -Enzyme kinetics - Factors affecting enzyme action - Enzyme inhibition.

Carbohydrate Metabolism

Definition, Classification of carbohydrates – Monosaccharide Disaccharide and polysaccharide. Metabolism – glycolytic pathway, TCA cycle, Electron transport chain, glycogenesis, Glycogenolysis and Gluconeogenesis. Disorder of carbohydrate metabolism-Diabetes mellitus – Definition, Types, Diagnosis and Complications and blood sugar regulation.

UNIT – II Protein Metabolism (14 Hours)

A. Definition, Classification of protein, Structure, Physical properties, Chemical properties, Amino acids- Essential and non- essential. General reaction of amino acid metabolism, Lipoproteins: Types, composition, role and significance in disease.

B. General pathways of catabolism of amino acids- . Formation of ammonia-Urea cycle Catabolism of amino acids-Degradation of carbon skeleton of amino acids

Inborn errors of aminoacid metabolism-Albuminuria, phenyl ketonuria, cystinuria and Maple syrup disease.

UNIT - III Lipid Metabolism (12 Hours)

A. Definition, Structure, Classification of lipids-Saturated, Unsaturated fatty acid, Bio Synthesis of fatty acid. Oxidation and biosynthesis of fatty acids (saturated and mono-unsaturated): Synthesis andutilization of ketone bodies, Ketosis, fatty livers.

B. Intestinal re-synthesis of triglycerides, - Oxidation and biosynthesis of saturated fatty acids

Formation and utilization of ketone bodies, v. Metabolism of cholesterol and phospholipids

C. **Inborn errors of fat metabolism**-Wolman disease, Gaucher's disease and Niemann pick disease.

UNIT- IV Nucleic Acid & Liver Function Metabolism (12 Hours)

A. Nucleic acids- Structure, replication, transcription, genetic code, elementary knowledge of biosynthesis of proteins.– Types, Composition, Functions, Transcription.

B. Informational molecules-

i. Purines, pyrimidines, nucleosides, nucleotides

ii. Structure and biosynthesis of: DNA ,RNA

iii. Mechanism of protein synthesis

iv. **Liver function test**- Functions of Liver, Tests based on metabolic functions, capacity for detoxification, enzymes, Bile Synthesis.

UNIT – V Basic Clinical Techniques (8 Hours)

Collection and preservation of blood and urine - Normal and abnormal constituents of urine and blood.

Renal Function Tests:

Insulin clearance test, urea clearance test, endogenous creatinine clearance, concentration test, add is test, mosenthal test, urea concentration test and dye test.

Topics for Self-study

- Oligosaccharides in health and disease.

  https://www.verywellfit.com/oligosaccharides-and-prebiotics-health-benefits-2242223

- Branched Chain Amino Acids in energy production.

  https://nutritionandmetabolism.biomedcentral.com/articles/10.1186/s12986-018-0271-1

- EPA and DHA in health.

  https://www.webmd.com/diet/features/what-to-know-about-omega-3s-and-fish#1

- Common genetic aberrations.

  https://www.medicinenet.com/genetic_disease/article.htm

Text Books

1. Ambika Shanmugam, "Fundamentals of Biochemistry for Medical Students", Seventh Edition, New Age Publishing Pvt. Ltd., New Delhi, 1986.
2. Deb. A.C., "Fundamentals of Bio-chemistry", 5th edition, New Central Book Agency (P) Ltd.,1992.
3. Sathyanarayana, U., Chakrapani, U., "Textbook of Biochemistry". 3rd edition, Books and Allied (P) Ltd, Kolkata, , 2010.

Reference Books

1. West, E.S., Todd, W.R., Mason, H.S and Van Bruggen, J.T, "Text book of biochemistry", Amerind , 4th Edition, Publishing Co Pvt. LTd., 1974.
2. Devlin, T.M., "Text Book of Biochemistry (with Clinical corrections)", 2nd edition, John Wiley and sons, 1986.
3. Ramakrishnan, S., Prassanan, K.G., Rajan, R., "Text book of Medical Biochemistry", 2nd edition, Orient Longman limited, 1989.
4. Voet D and Voet JG (2004) Biochemistry. 3rd Edition. John Wiley & Sons Inc. USA.

5. Berg JM, Tymoczko JL, Stryer L (2011) Biochemistry. International Edition, Seventh Edition, W.H. Freeman & Co.

6. Murray R K, Grannen DK, Mayes PA and Rodwell VW (2012) Harper's Illustrated Biochemistry. Twenty Ninth Edition, Lange Medical Book, Mc Graw Hill Edition.

7. Voet, D., Voet., J., &Pratt, C.W.(2013). Principles of biochemistry (4th ed.). International Student Version. John Wiley and sons, Inc.

8. Satyanarayana, U., & Chakrapani, U. (2013). Biochemistry (4th ed.). Elsevier.

9. Berg, J. M., Tymoczko, J. L., & Stryer, L. (2012). Biochemistry (7th ed.). New York: Freeman and company.

10. Rama Rao, A. V. S. S., & Suryalakshmi, A. (2009). A text book of biochemistry (11th ed.). UBS Publishers' Distributors Pvt. Ltd.

11. Lehninger, A.L., Cox, M.M., & Nelson, D.L. (2004). Lehninger principles of Biochemistry (4th ed.). New York: W. H. Freeman Company.

12. Baynes, J., &Dominiczak, M. (2002). Medical biochemistry. London: Mosby.

13. Murray, R. K., Granner, D. K., Mayes, P. A. & Rodwell, V. W. (2000). Harper's Biochemistry. McGraw-Hill.

14. Stryer, L. (1997). Biochemistry (4th ed.). New York: Freeman and Company.

15. Marshall, W. J., and Bangert, S. K. (2008).Clinical Biochemistry. Metabolic and clinical aspects. (3rd ed.). Churchill Livingstone.

16. Chatterjee, M. N., & Shinde, R. (1995). Textbook of medical biochemistry (2nd ed.). New Delhi: Jaypee Brothers Medical Publishers (P) Ltd.

17. Rostogi, S. C. (1993). Biochemistry. New Delhi: Tata McGraw Hill.

18. Orten, J.M. (1990). Human biochemistry (10th ed.). St. Louis: C.V. Mosby Publishers.

19. Godkar, P. B., &Godkar, D.P. (2003). Textbook of Medical Laboratory Technology (2nd ed). Mumbai.Bhalani Publishing House, India.

20. Gowenlock, A.H. (Ed.). (1996). Varley's practical clinical biochemistry. (6th ed.). New Delhi: CBS Publishers.

Course Type : ALLIED PRACRICAL-II	Course Title : Food Standard and Quality Control and Biochemistry Practical
Semester :III & IV	Code : U17NDYP2
Credits : 3	Hours /Week : 3

Course Outcomes

After the completion of this course the student swill be able to:

CO1 Read label and identify various preservatives and additives present in foods. (K2)

CO2 Perform simple techniques of identifying food adulterants. (K5)

CO3 Evaluate foods subjectively. (K5)

CO4 Analyze presence of sugar and protein in urine. (K4)

CO5 Estimate the quantity of glucose present in blood. (K5)

CO6 Estimate the cholesterol content of blood. (K5)

Syllabus

Qualitative Analysis of Urine and Blood.

1. Quantitative analysis of Urine sugar, protein, Bile pigments, Bile Salts
2. Estimation of Glucose in Urine (Benedict's Method)
3. Estimation of Urea in Urine (DAM Method)
4. Estimation of Blood Glucose (Folin- WU Method)
5. Estimation of Blood Urea (DAM Method)
6. Estimation of serum cholesterol (Zak's Method)

II Food Standard and Quality Control Practical

Display the standard food products available in the market.

III Food Adulterants

Physical and chemical method of identifying common food adulterants.

IV SE Common Foods

Sensory Evaluation of common foods by using five point Hedonic scale.

Reference Books

1. Inteaz Alli., "Food Quality Assurances, Principles and Practices", CRC Press, India.
2. Margaret M.C.Williams, "Food Fundamentals", John Wiley and Sons, London, 1974.

Course Type : NMEC-II	Course Title : DIET IN HEALTH AND DISEASE
Semester : IV	Code : U17ND4E2
Credits : 2	Hours /Week : 2

1. Course Outcomes

After completion of the course, students will be able to:

CO1 Identify the essentials of food constituents and its important functions in our body. (K2)

CO2 Explain the role of diet for persons with fever, obesity, underweight and anemia. (K4)

CO3 Compare the effect of healthy food and physical activity on human body. (K4)

CO4 Interpret the results of unhealthy life style and inheritance of genes (K4)

CO5 Discuss the nutritional requirements during different diseases and disorders. (K4)

CO6 Analyze the nutritional deficiencies and other risk factors associated with various nutritional problems and its dietary management. (K4)

2. Syllabus

Unit – I Nutrition and Nutrients **6 Hours**

Food-definition, classification of food, basic five food groups classification of nutrients, RDA-reference man and women, factors influencing RDA. Macronutrients and micronutrients.

UNIT – II Diet in Fever **6 Hours**

a. Causes, Types, general Dietary consideration

b. Typhoid ,Influenza, Malaria and Tuberculosis

c. Diet in Obesity and underweight.

d. Nutritional Anaemia –prevalence, causes, Types, iron deficiency anaemia and Prevention of anaemia.

UNIY– III Diet in Cardiovascular Disease **6 Hours**

a. Prevalence, clinical effects
b. Risk factors, Role of fat in the development of atherosclerosis
c. Hypertension
d. Dietary management
e. Physical activity and Heart diseases

UNIT IV Diet in Diabetes Mellitus **6 Hours**

a. Prevalence, Types, etiology and symptoms
b. Diagnosis ,treatment and Complication
c. Dietary management

Diet in Diseases of the Kidney

a. Functions of kidney
b. Symptoms, Chronic and acute renal failure and urinary Calculi
c. Principles of Dietary Management

UNIT V Diet in Cancer **6 Hours**

a. Risk factors and Symptoms
b. Nutritional problems of Cancer therapy
c. Nutritional requirements
d. Role of food in the prevention of cancer.

Topics for Self-Study

1. Role of fiber in health and disease.

   https://www.mayoclinic.org/healthy-lifestyle/nutrition-and-healthy-eating/in-depth/fiber/art-20043983

2. Common immunity boosters which help in viral infections.

   https://www.onhealth.com/content/1/immune_system_boosting_foods

3. Prevention of diabetes and heart disease through lifestyle modification.

   https://www.health.harvard.edu/newsletter_article/Lifestyle_prevention_Does_it_work_And_why

4. Harmful preservatives found in junk food.

   https://www.icicilombard.com/blog/health-insurance/hi/5-harmful-effects-of-junk-food

Reference Books

1. Antia P. "Clinical Dietetics and Nutrition", 2nd edition, Oxford University Press.
2. Garrow J.S, James W.P.T, Ralph A, (2000), "Human Nutrition and Dietetics", 10th edition, Churchill Livingston, London.
3. Srilakshmi B, "Dietetics", 7th Edition, New Age International, New Delhi, (2016).

Course Type : Theory - Core V	Course Title : DIETETICS- I
Semester : V	Course Code : U17ND505
Credits : 6	Hours / Week : 6

Course Outcomes

After Completion of the Course, the Students will be able to:

CO1 Comprehend the concept, purpose and principles of diet therapy and role and types of dietitians. (K4)

CO2 Explain in-depth knowledge in the running of a dietary department ina hospital. (K3)

CO3 Identify and solve problems by thinking critically and integrating scientific information and research into practice. (K3)

CO4 Develop and deliver appropriate information, products, and services to individuals, groups, and populations. (K5)

CO5 Evaluate the role of various feeding techniques and identify the appropriate technique needed for a specific patient and discuss the role of various nutraceuticals as a dietary supplement. (K5)

CO6 Formulate etiological factors and complications, assessment parameters and dietary modifications in management of weight andthe dietetic treatment for diseases of digestive system. (K5)

UNIT – I Basic Concepts About Dietetics (18 hours)

a. Definition of dietetics, dietitian, goals of diet therapy.

b. Types of dietitian, role and responsibilities of dietitians, qualifications, qualities and professional ethics, code of conduct.

c. Therapeutic adaptations of normal diet, Routine hospital diets – Regular, soft, full fluid, clear fluid diet.

d. Specially modified therapeutic diets, High calorie, low calorie, high and low protein, bland, high and low residue diets.

UNIT- II Special Feeding Methods (18 hours)

a. Enteral nutrition – methods – nasogastric, gastrostomy and jejunostomy. Types of food, infusion techniques, TPN – Types of infusion, TPN formula for adults.

b. Dietary modification, diet planning and preventive measures for – PEM, iron deficiency anaemia and Vitamin A deficiency.

c. Causes, risk factors, pathogenesis, dietary modifications, diet planning and counseling measures for febrile conditions – fevers of long duration and short duration.

UNIT - III Malnutrition (18 hours)

a. Causes, risk factors, pathogenesis, dietary modifications, diet planning and counseling measures for overweight.

b. Causes, risk factors, pathogenesis, dietary modifications, diet planning and counseling for underweight.

c. Anorexia nervosa and Bulemia.

UNIT IV Diseases of the Gastrointestinal Tract (18 hours)

Diseases of upper-gastrointestinal tract: Causes, pathogenesis, dietary modification and diet planning for:

(i) GERD

(ii) Gastritis

(iii) Peptic ulcer

Diseases of lower-intestinal tract: Causes, pathogenesis, dietary modification and diet planning for:

(i) Diarrhea, dysentery

(ii) Constipation.

(iii) Haemorrhoids.

(iv) Surgery of colon – gastrostomy, jejunostomy.

(v) Cancer of colon.

UNIT V Nutraceuticals & Dietary Counselling (18 hours)

(i) Nutraceuticals – Definition, types, use of nutraceuticals in the prevention and treatment of – obesity, Diabetes, CVD and Cancer.

(ii) Functional foods .

Topics for Self-Study

- Type of feeding in pre-term neonates.

  https://www.who.int/elena/titles/feeding_vlbw_infants/en/

- Different type of feeding techniques in bariatric surgery.

  https://www.mayoclinic.org/tests-procedures/gastric-bypass-surgery/in-depth/gastric-bypass-diet/art-20048472

- Traditional functional foods in preventing viral infections.

  https://encyclopedia.pub/item/revision/1c614cb88c258b6b3e8e24d193f76d33

- Nutraceuticals in alopecia. Nutraceuticals in alopecia.

Text Books

1. Srilakshmi, B. "Dietetics", 7th Edition, New Age International P. Ltd., New Delhi, 2016.
2. "Dietary Guidelines of Indians" – A Manual, National Institute of Nutrition, Hyderabad, 2011.
3. Garg, M. ,"Diet, Nutrition and Health", ABD Publishers, 2006.
4. Corinne H.Robinson, M.R.Lawber, W.L.Chenoweth and A.E.Garwick, "Normal and Therapeutic Nutrition", MacMillan Publishing CO, New York, 1982

Reference Books

1. Krause, M.V. and Mahan, L.K. "Food, Nutrition and Diet Therapy",14th Edition W.B. Saunders Company, Philadelphia, 2009.
2. Maimun Nisha, "Diet Planning for Diseases", Kalpaz Publishers, 2006.

Course Type : Theory- Core VI	Course Title : COMMUNITY NUTRITION
Semester : V	Course Code : U17ND506
Credits : 6	Hours / Week : 6

Course outcomes

After completion of this course the students will be able to:

CO1 Develop ideas to improve health and nutrition in the community. (K4)

CO2 Predict the reasons for malnutrition and improve the health status of affected individuals. (K5)

CO3 Summarize the role of different National and International organizations for the welfare of individuals. (K5)

CO4 Explain prophylaxis programmes, a Solution to nutrition crisis using nutrition education. (K4)

CO5 Evaluate the relationship between malnutrition and national disasters and other environmental factors to create awareness using nutrition education. (K5)

CO6 Assess the nutritional status of the individuals using various assessment methods. (K5)

Syllabus

UNIT - I Malnutrition (15 Hours)

Nutrition and health in National Development: Malnutrition –Introduction, causes- Physical issues, Social factors,, Etiology , symptoms, Under nutrition and Over nutrition, Prevalence of malnutrition, balance between food and population growth. Screening of the community to identify malnutrition

UNIT - II Macro and Micro Nutrient Deficiency (15 Hours)

A. Nutritional problems confronting our country - PEM - classification - Kwashiorkar and Marasmus - etiology, symptoms, pathological changes, biochemical changes,

B. Anaemia- etiology, symptoms, prophylaxis Prevalence programmes.

C. Iodine Deficiency- Introduction, Causes, Symptoms and Deficiency disorders.

D. Vitamin B12, folate and ferritin deficiency

UNIT – III Nutritional Assessment (15 Hours)

A. Introduction to concepts used in nutritional assessments - Demonstration of direct methods to assess nutritional status, Methods of assessment of Nutritional status - sampling, Direct assessment -ABCDE & F Anthropometry, biochemical estimation, clinical, Dietary pattern, Economic and social status.

B. Indirect methods to assess nutritional status, Exposure to the current techniques for specific nutrient status assessment - Food balance sheet, Agricultural data, Ecological parameter and vital statistics, use of growth chart.

UNIT – IV Nutritional Programme (15 Hours)

A. Role of National and International organizations - ICDS, Noon Meal Prograzmme, (MDM) ICMR, ICAR, CSIR, NIN, ANP(Applied Nutrition Program) BNP(Balwadi Nutrition Program),

B. National Nutrition Policy,- i. Short term policies ii) Long term policy SNP(Special nutrition Program), National Program for Prevention of Blindness due to Vitamin A Deficiency; and 9) National Goiter Control Program (NGCP). Role of International organizations-FAO, WHO, UNICEF, CARE

UNIT – V Nutrition Education & Intervention Programme (15 Hours)

A. Nutrition Education - Meaning, Scope, Methods - Planning, conduct of evaluation of Nutrition education Programme. Formulation of nutrition assessment questionnaire. Development of nutrition assessment tools, Role of ICT tools in nutrition education.

B. Balika Mandal (For Girls in the Age Group 15-18 Years), Vitamin A Prophylaxis Programme, National Nutritional Anaemia Prophylaxis Programme, Tithi Bhojan, FFW MCH programmes for safe motherhood and child survival programmes, and Akshaya Patra.

Topics for Self-Study

- Incidence of vitamin B-complex deficiency in malnourished children.

  http://www.theprofesional.com/index.php/tpmj/article/download/3937/3041/

- Food security and national development.

  http://www.fao.org/sustainable-development-goals/overview/fao-and-the-post-2015-development-agenda/food-security-and-the-right-to-food/en/

- New nutritional policies implemented recently (after 2018).

  https://niti.gov.in/writereaddata/files/document_publication/Nutrition_Strategy_Booklet.pdf

- Public distribution system.

  https://economictimes.indiatimes.com/definition/Public-distribution-system

Text Books

1. A Lesties Banks and Hislop J.A., "Health and Hygiene", Universal Tutorial Press, London, 1987.
2. Senha H.K, "Challenges in Rural Development" Discovery publishing, 1996.
3. "Food consumption and planning" - Vol V, International encyclopedia, 1998

Reference Books

1. Willium Hobson., "Theory and practice of public Health", Oxford University Press, London, 2001
2. Sabarwal B, "Applied Nutrition and Health Education", Common Wealth publishers, New Delhi,2003
3. Barbara Hernandez., McGraw Hill., "Foundations of Community Health Education, London,1999
4. P.K. Shukla, "Nutritional Problems of India", Prentice Hall, India,2001
5. Gulani KK. Community Health Nursing. Ist ED. Kumar Publishing house. New Delhi, 2005, 662-664.

Course Type : CORE PRACTICAL V	Course Title DIETETICS I PRACTICAL
Semester : V	**Course Code : U17ND5P5**
Credits : 2	**Hours / Week :** 4

Course Outcomes

CO1 Analyze the epidemiology of various diseases and plan diet accordingly. (K4)

CO2 Evaluate the need of each and every patient and plan diet according to their individual needs. (K5)

CO3 Plan and execute a diet for various disease conditions.(K6)

CO4 Acquire practical knowledge in hospitals by attending dietary internship.(K5)

CO5 Equip themselves in the field of dietetics and to approach different patients. (K6)

CO6 Develop the managerial skills in preparation of diet and supervision both professionally and personally. (K6)

Planning, Nutritive Value Calculation and Preparation of Various Diets

a. Clear fluid diet, full fluid diet and soft diet.

b. Low and medium cost diet for protein calorie malnutrition,

c. Fevers

d. Diet for Vitamin A deficiency and iron deficiency anaemia

e. Diet for Obese and underweight conditions.

f. Diet for Peptic ulcer, diarrhoea and constipation.

g. Diet for Surgery and burns.

Reference Books

1. Garg. M. Diet, "Nutrition and Health", ABD Publishers, 2006.

2. NIN, "Dietary Guidelines of Indians- A Manual", National Institute of Nutrition, Hyderabad, 2011.

Course Type : Elective-I	Course Title : Food Processing
Semester : V	Code : U21ND5:1
Credits : 5	Hours / Week : 5

1. Course Outcomes

After the completion of this course the students will be able to:

CO1 Identify the different types of cereal grains and their effects on nutritional quality and prepare their starch for food, fodder and industrial use.(K2)

CO2 Analyze the effect of processing of legumes on their nutrient composition with regards to quantity and quality. (K3)

CO3 Evaluate the technological operations during ***oil*** refining ***process*** on polycyclic aromatic hydrocarbons (K4)

CO4 Evaluate the role of processing fruits and vegetable, juice concentrates and powders, as well as by- products from fruits and vegetable waste.

CO5 Develop different types of milk and meat based products and their effects.

CO6 Effectively utilize agricultural commodities in developing healthy and nutritious foods.

Unit – I Cereal Processing (12 Hours)

Scope and importance of food processing. Cereal – processing of raw and parboiled rice and rice products- Puffing and flaking. Wheat and corn processing, feed for live stock from wheat bran and germ. Potato processing – potato chip, flakes and powder

Unit – II Pulses and Legumes Processing (12 Hours)

Decortication processing of legumes, effect of processing of legumes on their nutrient composition and quantity and quality, quick cooking legumes, instant legume powders, legume protein concentrates, byproducts utilization of legume processing and storage of legumes.

Unit III Processing of Oil Seeds (15 Hours)

Processing of oil seeds, packing and storage of fats and oils, change during storage of oils. Oil specialty products - margarine, mayonnaise, sal addressing and fat substitutes, Nutritional food mixes from oil seeds – processing oil seeds for food use, protein enriched foods

Unit IV Fruits and Vegetables Processing (15 Hours)

Storage and handling of fresh fruits and vegetables, processing of fruits and vegetables juice concentrates and powders, by- products from fruits and vegetables waste. Canning process of fruits and vegetables. Cultivation of mushroom and its processed products.

Unit V Milk and Meat Processing (18 Hours)

Processing of milk, manufacture of butter, paneer and cheese. Fish processing – canning, freezing, drying, salting, smoking and curing, uses of by-products. Meat processing – curing and smoking, Poultry and egg powder – processing and storage.

Unit VI Self study

1. Processing and preserving strategies on antioxidant food tablets and supplements

   https://www.longdom.org/proceedings/processing-and-preserving-strategies-on-antioxidant-food-tablets-and-supplements-47477.html

2. Effect of Temperature and Time Combinations on Colour Characteristics, Mineral and vitamin content of nuts –

   https://www.longdom.org/open-access/effect-of-temperature-and-time-combinations-on- colour-characteristics-mineral-and-vitamin-content-raw-and-roasted-cashew.pdf

3. Environmental indicators in land leveling using artificial intelligence techniques

   https://www.longdom.org/open-access/prediction-of-environmental-indicators-in-land-leveling-using-artificial-intelligence-techniques.pdf

Reference Books

1. Norman N. P. and Joseph H.H, Food science, CBS Publishing New Delhi, 1997.
2. Stadelman W.J., Olson V.M, Shemwell G.A and Parch S., Egg and poultry meat processing, Elliwood Ltd,1998..
3. Subbulakshmi G., Shobha A. Udipi, Food processing and preservation, New age international publisher, New Delhi, 2008.
4. Sivasankar B., Food Processing and Preservation, PHI Learning private limited, New Delhi,2015.
5. Sumati R. Mudambi, M.V. Rajagopal., Fundamental of food, nutrition and diet therapy. New age international publishers, New Delhi, 2015.

Course Type : Theory-Elective II	Course Title : Principles of Resource Management and Interior Design
Semester : V	Course Code : U21ND5:2
Credits : 5	Hours / Week : 5

1. Course Outcomes

After the completion of this course the students will be able to:

CO1 Make use of efficient management skills with good managerial potentials and Identify human and non-human resources for efficient management of the family (K3)

CO2 Explain put forth by recent trends in availability of resources (K2)

CO3 Evaluate elements needed for appropriate designing to achieve required visual effect. (K5)

CO4 Analyze theme-based color harmonies in interiors. (K3)

CO5 Evaluate and choose furniture for different areas of an establishment. (K5)

CO6 Determine the composition, construction, and finishes applied on fabrics for furnishings. (K5)

1. Syllabus

UNIT I Management (18 hours)

1.1 **Resource Management**: Understanding, meaning, classification and characteristics of resources, factors affecting utilization of resources.

1.2 Maximizing the use of resources and resource conservation.

1.3 Availability and management of specific resources by an individual / family-money, time, energy, space.

1.4 **Functions of management**: Decision making, planning, supervising, controlling, organizing.

UNIT II Design & Colour (18 hours)

2.1 **Design and good taste**: Objectives of aesthetic planning, beauty, expressiveness, functionalism, concept of design, purpose of design, elements of design, types of design, structural design and decorative design.

2.2 **Colour**: Sources of colour – dimension of colour (hue, value, intensify/chroma). The pang colour system (primary, secondary, intermediate hue, tertiary and quaternary colour).

2.3 **Procedure for Making a Colour Scheme for a Room**: Factors affecting the use of colour scheme for room (the room, mood, style, fashion, personality, possession).

2.4 Application of art principle in the use of colours for a room (balance, proportion, harmony, rhythm, emphasis).

UNIT III Lighting (18 hours)

3.1 **Lighting**: Source of light (natural, artificial light).

3.2 **Types of Lighting**: General/ambient lighting, task lighting, accent lighting.

3.3 **Requirements of an Ideal Lighting Installation** – Steadiness of the source of light, elimination of glare, avoidance of shadows, sufficient illumination to suit the nature of the visual task, nonproduction of excessive heat, minimum consumption of oxygen from the air.

UNIT IV Furniture and Furnishings (18 hours)

4.1 **Furniture**: Requirement and arrangement in the home, materials used in furnishing items.

4.2 **Furnishing**: Different types of furnishing, factors considered in the selection of furnishing.

4.3 **Floor coverings**: Factors for selecting floor coverings, salient features of carpet, types use and care of floor coverings.

UNIT V Accessories (18 hours)

5.1 Accessories: Selection, types, use and care of accessories.

5.2 Traditional and Modern: Art objects, pictures.

5.3 Flower arrangement: Principles, types and steps in preparing flower arrangement.

Topics for Self-Study

- Comparison of resource management techniques at home and industry.

  https://www.planview.com/resources/guide/resource-management-software/top-12-resource-management-best-practices/

- Interior design for budget consumers.

  https://www.housebeautiful.com/home-remodeling/interior-designers/g4293/interior-designer-tricks-to-update-a-room/

- National and international flower arrangements.

  https://www.myweddingplanning.in/wedding-flower-decor

- Personal touch in decorating your house.

  https://www.homify.in/ideabooks/729123/here-s-how-to-add-a-personal-touch-to-your-home-decor

Text Books

1. Graig, H.T., and Rush, C.H. "Homes with Character", D.C. Health and Company, Boston 1965.
2. Alexender, M.J., "Designing Interior Environment", Har Court Brace Jauaroui Inc., New York, 1972.
3. Sherwood, R.F. "Homes Today and Tomorrow", Chart Bannet, Co., Inc., PEORIC, Illinois, 1972.
4. Premavathy Seetharaman and Parveen Banu, "Interior Design and Decoration", CBS Publishers, New Delhi, 2007.

Reference Books

1. Nickell, P. and Dorsey, J.M. "Management in Family Living", John Wiley and Sons, Inc, New York 1960.
2. Goldstein, H and Goldstein, V. "Art in Everyday Life", Macmillan and Company, New York, 1966.
3. Rutt, A.H., "Home Furnishings", John Wiley and Sons, New York, 1961.
4. Roy Day, "All about Decorating Your Home" Hamlyn, London, 1976.

Course Type : Theory – SBEC II	Course Title : DIET AND COUNSELING
Semester : V	Course Code : U21ND5S2
Credits : 2	Hours / Week : 2

Course Outcomes

Upon completion of the course, students will be able to:

CO1 Explain the concept, purpose and principles of diet counseling. (K5)

CO2 Develop in-depth knowledge in various conditions and planning a diet for the same. (K3)

CO3 Identify and solve food related issues with teaching aids and diet charts. (K3)

CO4 Develop and deliver appropriate information, products, and services to individuals, groups, and populations. (K3)

CO5 Evaluate the role of diet counselor and identify the appropriate teaching aids. (K5)

CO6 Develop a good communication and skills in computer menus to develop digital teaching aids. (K6)

2. Syllabus

UNIT – 1 Counseling (6 hours)

Definition , History and importance of counseling, scope of counseling, types of counseling , Practical consideration in giving dietary advice and counseling - Factors affecting and individual food choice. Communication of dietary advice c) Consideration of behavior modification d) Motivation. The Counseling Process - Techniques for obtaining relevant information- Clinical Information, Medical History and General Profile, nutritional assessment, Dietary diagnosis- Assessing food and nutrient intakes, Lifestyles, physical activity, stress.

UNIT –II Counseling and Educating Patient (6 hours)

Introduction to nutrition counseling Determining the role of nutrition counselor, Responsibilities of the nutrition counselor, Practitioner v/s client managed care, Conceptualizing entrepreneur skills and behavior f) Communication and negotiation skills. Evaluation - Measuring the success of performance of client and evaluating the counseling process.

UNIT - III Teaching Aids (6 hours)

Introduction, Scope and Importance of Teaching aids used by Counselor charts, leaflets, posters, Pamphlets and other materials etc., preparation of teaching material for patients suffering from NCD'S- Digestive disorders, Hypertension, Diabetes, Atherosclerosis & Hepatitis and cirrhosis.

Implementation - Counseling the client/patient – client concurrence, co-ordination of care plans-the provision of learning experience.

UNIT-IV Computer Use (5 hours)

Introduction, History of computer in hospital administration, computer menu Importance of computer using in counseling session, Computer application a) Use of computers by dietitian b) Dietary computations,Dietetic management, Education/ training , Information storage, Administrations and Research.

UNIT-V Computer Application (7 hours)

Computer application Scope of computer in counseling, methods of counseling apparatus, Digital counseling aids and importance, Execution of software packages , Straight line, frequency table, bar diagram, pie chart, Preparation of dietary charts for patients c) Statistical computation- mean, median, standard deviation, conclusion and regression test.

Topics for Self Study

1. Setting up Small, Medium & Large scale industry, Quality and quantity control in nutrition industries,

   https://www.nutritionenterprisesinc.com/

2. Location of an enterprise, steps for starting a small industry, incentives and subsidies, exploring export possibilities.-

   http://www.zonalinfo.com/shopinfo/hyderabad/enterprise/fitness-and-nutrition-enterprises/2699418

   https://sightandlife.org/wp-content/uploads/2017/12/SALmagazine_ Technology and Entrepreneurship_NutritionEntrepreneurs_181215.pdf

Reference Books

1. Antia F.P. Clinical dietetics and nutrition., Oxford University Press, New Delhi 2008.
2. Mahan, L.K. and Escott-Stump S., Krause's Food Nutrition and Diet Therapy 10th Edition, W.B. Saunders Ltd, 2000.
3. Zeeman, Frances J. Applications of clinical nutrition. Englewood cliffs: Prentice Hall International Inc., 1998.

4. Thomas Briony; (1995). Blackwell Manual of Dietetic practise. (2nd Ed.) Oxford: New York .,1995.

5. Robinson., Normal and therapeutic nutrition.: Macmillan Pub. Company New York , 2006.

6. Sumati R. Mudambi, M.V. Rajagopal., Fundamental of food, nutrition and diet therapy. New age international publishers, New Delhi, 2015.

7. Srilakshmi B., Dietetics, New age international publishers, New Delhi, 2014.

Course Type : Theory - SBECIII	Course Title : Entrepreneurship Development
Semester : V	Course Code : U21ND5S3
Credits : 2	Hours / Week : 2

Course Outcomes

After completion of this course the students will be able to:

CO1 Identify, the nature of entrepreneurship and the meaning of entrepreneur. (K2)

CO2 Analyze the different types of business, importance and its purpose to the small and large scale industry.(K4)

CO3 Discuss the process of designing gathering and reporting information and solve a specific marketing problems.(K5)

CO4 Formulation of policies, procedures and rules for marketing management, financial management and human resource management. (K5)

CO5 Explain the nature and purposes of marketing and the fundamentals of market assessment, market regulation (K5)

CO6 Create presentations and business plans that articulate and apply financial operational, organizational market and improve communication and problem solving skills. (K6)

Syllabus

Unit - I Entrepreneur (6 Hours)

Definition, qualities and essential skills of an entrepreneur, communication and presentation skill; innovativeness; idea generation and SWOT analysis. Steps to start a small enterprise, learning journey of a successful entrepreneur.

Unit - II Business Plan for Small Enterprises (6 Hours)

Importance of business plan, purpose, contents and benefits of business plan; business plan creation process, benefits of business plan, preparation of sample business plan. Business ethics and etiquettes.

Unit - III Market Survey (6 Hours)

Meaning, process of conducting market survey, points to be considered for effective market research; steps to register a company; regulatory requirements.

UNIT – IV Management Process and Policies (6 Hours)

Importance of policy creation, corporate governance, management process, management functions- production and operation management, marketing management, financial management and human resource management. Pricing policy and methods of pricing.

UNIT – V Marketing Management (6 Hours)

Definition, Concept of marketing, market assessment, market regulation, market targeting, marketing mix, promotional strategies and tips for successful marketing. Financial needs: Types of financial needs- fixed and working capital; methods of raising capital, working capital management, working capital cycle.

Self Study

1. Setting up Small, Medium & Large scale industry, Quality and quantity control in nutrition industries,

   https://www.nutritionenterprisesinc.com/

2. Location of an enterprise, steps for starting a small industry, incentives and subsidies, exploring export possibilities.-

   http://www.zonalinfo.com/shopinfo/hyderabad/enterprise/fitness-and-nutrition-enterprises/2699418

   https://sightandlife.org/wp-content/uploads/2017/12/SALmagazine_ Technology and Entrepreneurship_NutritionEntrepreneurs_181215.pdf

Reference Books

1. Entrepreneurship development- Your gateway to the journey of entrepreneurship, ICT Academy of Tamil Nadu, Chennai. 2015.
2. S.S. Khanka, Entrepreneurial development, S. Chand Publications, 2007.
3. Vasant Desai, Entrepreneurial development, Vol-1, Himalaya Publishing House, 2009

Course Type : Theory - Core VII	Course Title : DIETETICS - II
Semester : VI	Course Code : U17ND607
Credits : 5	Hours / Week : 6

Course Outcomes

CO1 Identify the concept, purpose and principles of diet therapy and the effect of the role and types of dietitians. Gain in-depth knowledge in the running of a dietary department in a hospital.

CO2 Analyze solve problems by thinking critically and integrating scientific information and research into practice. (K4)

CO3 Develop and deliver appropriate information ,products ,and services to individuals, groups, and populations. (K5)

CO4 Evaluate the role of various feeding techniques and identify the appropriate technique needed for a specific patient. (K5)

CO5 Suggest the tilogical factors and complications ,assessment parameters and dietary modifications in management of weight. (K5)

CO6 Provides opportunity for interaction with patients, and thus, students and, in association with dietitians and clinicians. (K5)

2. Syllabus

UNIT - I **(18 Hours)**

Diabetes Mellitus - Introduction of Diabetes Mellitus

a) Dietary treatment and medical management of Type 1 Diabetes, Type 2 Diabetes & Gestational diabetes.

b) Pathogenesis, Symptoms, Causes, Diagnostic tests, Complications.

c) Dietary modification and diet planning of the disease.

d) Dietary management of diabetes in special conditions

e). Complications of diabetes mellitus (acute and chronic) and its management

UNIT II **(18 Hours)**

Diseases of the Liver

a) Diseases of the liver, gall bladder and exocrine pancreas – pathogenesis, causes, signs and symptoms, dietary modifications and diet planning for:

i. Liver- fatty liver, hepatitis, cirrhosis, hepatic coma

ii. Gall bladder – cholecystiits, cholelithiasis

iii. Pancreas – Pancreatitis.

b) Nutritional care for patients with inborn errors of metabolism – prognosis, symptoms, dietary management – phenylketonuria, galactosemia.

UNIT – III **(18 Hours)**

Kidney Disease

a) Functional units in the kidney -Etiology, clinical findings and dietary treatment of different states of renal disease, Protein requirement, electrolytes and fluid balance with the progression of renal disease, . Dietary modifications in renal diseases with other conditions .this has to come first

b) Pathogenesis ,Symptoms, causes, Nutritional modification, diet planning and dialysis for kidney disease

a) Nephritis

b) Nephrosis

c) Urinary Calculi

d) Renal failure – acute and chronic

UNIT IV **(18 Hours)**

Disease of the Cardio Vascular System

Pathogenesis, symptoms, causes, diagnostic tests, complications, dietary modification and diet planning of:

a) Hypertension

b) Atherosclerosis – Myocardial infarction

c) Ischemic heart disease

d) Hyperlipidemia

e) Acute and Chronic cardiac disease and congestive cardiac failure.

f) CABG.

g) Role of phytochemicals and phytotherapy in therapeutic conditions

h) Cardiac function tests.

i) Rheumatic heart disease

UNIT-V **(18 Hours)**

Medical Nutrition Therapy

A. Medical Nutrition Therapy in Critical Care - i. Metabolic response to stress ii. Nutrients for critically ill patients Fluid, electrolyte and acid-base requirements

B. Nutritional Management of Oncology patients -Nutrition Screening and Assessment in Oncology Medical Nutrition Therapy for different types of cancer.

Topics for Self-Study

1 Diseases caused due to auto immunity and dietary modifications for the same.

https://www.todaysdietitian.com/newarchives/110211p36.shtml

2. Correlation between diabetes, cardiac disease and renal disease.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4045477/

3. Cardiac transplant and liver transplant–feeding patterns.

https://journals.lww.com/transplantationdirect/Fulltext/2019/01000/Simultaneous_Versus_Sequential_Heart_liver.9.aspx

4. Nutrition in neurological disorders.

https://lllnutrition.com/mod_lll/TOPIC25/m251.pdf

Text Books

1. Antia, F.P, "Clinical dietetics and Nutrition", 4th Edition, Oxford University Press, New Delhi,2002.
2. Joshi, S.A, "Nutrition and Dietetics",2nd edition, TATA McGraw Hill Publications, New Delhi, 2008.
3. Srilakshmi. B, "Dietetics", 7th Edition, New Age International (P) Ltd. Publishers, Chennai, 2016.
4. Swaminathan, M. "Essentials of Food and Nutrition-Vol. I and II" BAPPCO., The Bangalore Printing and Publishing co., ltd., No.88, Mysore Road, Bangalore ,2010
5. Davidson and passmore, "Human Nutrition and Dietetics", English Language Book Society, Livingstone,1986.

Reference Books

1. Mahan,L.K., Arlin.M.T., Krause's, "Food Nutrition and Diet Therapy", 14TH Edition. W.B.Saunder Company, London ,2016.
2. Williams, S.R., "Nutrition and Diet Therapy", 6th Edition, Times Mirror / Mosby College Publishing, St. Louis, 1989.
3. Raheena Begum, "A Text Book of Foods, Nutrition and Dietetics", Sterling Publishers, New Delhi.1989.
4. Gopalan, C., "Dietary Guidelines for Indians – A Manual", National Institute of Nutrition, Hyderabad, 2005

5. Shills, M.E, Oslon, J.A, Shike, M and Ross, A.C, "Modern Nutrition in Health and Disease", 10th Edition, Lippincott Williams and Wilkins 2006.

6. Wardlaw M, G. (1999) Perspectives In Nutrition. (4thed) .USA : WCB/ McGraw – Hill.

7. Zeman J. F. & Ney M. D. (1988). Application of Clinical Nutrition. London : Prentice – Hall International.

8. Shills E, M.& Olson A, J. & Shike, M. (Eds).(1994) Modern Nutrition in Health and Disease. (8thed.). USA : Lea & Febige.

9. Williams, R. (1993). Nutrition and Diet Therapy (7th ed.).USA : Mosby Year book. Inc.

10. Anderson, D. (1982). Nutrition in Health and Disease (17th ed.) . Philadelphia : J. B. Lippincott Company.

11. Alpers, D. & Stenson, W. & Denis, B. (1995) Manual of Nutrition Therapeutics (3rd ed.) Boston : Little Brown and Company.

Course Type : Theory-Core VIII	Course Title : FITNESS AND SPORTS NUTRITION
Semester : VI	Course Code : U17ND608
Credits : 5	Hours /Week : 6

Course Outcome

After completion of this course the students will be able to:

CO1 Obtain knowledge regarding the body composition and their techniques to measure.

C02 Understand the importance and of fitness to enhance endurance, strength and flexibility.

CO3 Assess the sports persons regarding their cardiovascular endurance, muscular strength and endurance and flexibility.

CO4 Analyze the need of nutrients and their metabolism during exercise.

CO5 Evaluate the significant changes during exercise, needs of the sports persons and the role of nutritional supplements.

CO6 Compare the effects of yoga and fitness on various body systems and the nutritional needs in special conditions.

UNIT – I Body Composition and Fitness (18 Hours)

A. **Body Composition -** classification (Fat mass and fat free Mass) and its components, factors influencing body mass composition. Techniques for measuring body composition Muscular-skeletal anatomy - i. General anatomy and physiology ii. Kinds of muscles
iii. structure of skeletal muscle

B. **Fitness-**definition, parameters of fitness- cardiovascular endurance, muscular strength, muscular endurance, flexibility and body composition

UNIT - II Assessment and Benefit of Exercise (18 Hours)

A. **Benefit of exercise**- physiological, psychological and sociological. Physical activity guidelines. Role of hormones in exercise

Assessing personal fitness- preparticipation, screening and risk assessment.

B. Dynamics of pulmonary ventilation and exercise - i. Regulation of ventilation in exercise iii. Pulmonary ventilation during Exercise v. Ventilation and energy demands. Energy cost of breathing RQ, VO_2 max and OBLA

UNIT – III Energy Systems and Electrolyte Balance (18 Hours)

A. Reference sports person- dietary recommendations and principles of diet planning Carbohydrate intake and exercise: i. Pre exercise diet ii. Carbohydrate supplementation during exercise iii. Post exercise diet iv. Carbohydrate utilization during exercise

B. **Reviews of Different Energy Systems for Endurance and Power Activity-** Fuels and nutrients to support physical activity .Shifts in carbohydrate and fat metabolism, mobilization of fat stores during exercise.

C. **Water and Electrolyte Balance-** Losses and their replenishment during exercise and sports event, effect of dehydration, sports drinks.

UNIT-IV (18 Hours)

A. **Nutrition for Sport Persons**

Definition, physiological and significant changes during exercise, types of stress faced by sports persons, nutrition needs of sports persons- macro and micronutrient needs, role of water and electrolytes.

B. **Role of Nutrition and Recommendations** – pre-exercise, during and post –exercise Nutrition supplement and ergogenic aids. Sports drinks and hydration aids . Nutritional problems of athletes

C. Proteins and protein supplementation i. Dietary protein requirements for endurance and strength trainers, Protein feeding pre, during and post event

UNIT- V Yoga and Nutrition Fitness in Special Conditions (18 Hours)

A. **Yoga and Fitness-** effects on general vitality and on immune, endocrine, neurons, digestion and muscular systems, dietary pattern. Awareness about the alternative systems for health and fitness like ayurveda, yoga, vegetarianism and traditional diets.

B. **Nutrition and Fitness in Special Conditions-** space mission and high attitude-changes in body composition, nutrient requirements, food system and suitable types of food.

Topics for Self-study

1. BCAA as sports supplement.

   https://www.otsuka.co.jp/en/nutraceutical/about/nutrition/sports-nutrition/essential-nutrients/bcaa.html#:

2. Carbohydrate loading.

   https://www.mayoclinic.org/healthy-lifestyle/nutrition-and-healthy-eating/in-depth/carbohydrate-loading/art-20048518

3. Female athletetriad.

   https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3435916/#:

4. Difference between sports drink and health drink.

   https://www.aappublications.org/content/32/6/32.2#

Text Books

1. Mahan, L.K. & Ecott - Stumps, Krause's "Food, Nutrition and Diet therapy", 14th edition, W.B.Sunders Ltd, 2016.
2. Sizer, F. & Whitney, E., "Nutrition- Concepts & Controversies", 8th edition, Wadsworth Thomson learning, 2000.
3. Shills, M.E., Olson, J.A., Shike, N. and Ross, A.C.(Ed), "Modern Nutrition in Health & disease", 9th edition, Williams & Wilkins,1999.

Reference Books

1. Whitney, E.N. &Rolfes, S.R., "Understanding Nutrition", 8thedition, West/Wadsworth, an International Thomson publishing Co., 2002
2. Ira Wolinsky ,Ed) ,"Nutrition in exercise and sports", 3rd Edition, CRC press, 1988
3. Parizkova, J. "Nutrition, physical activity and health in early life", Ed. Wolinsky, I., CRC press, 2001
4. Mc Ardle, W.Katch, F. and Katch, V. "Exercise Physiology. Energy, Nutrition and Human performance", 4th edition, Williams and Wilkins, Philadelphia, 2009
5. Barbak Ann Dushman, "Complete guide to fitness and health", American college of sports medicine library and congress catalog in publication data, 2006.
6. Edward, H., & Terjuny, R. (1988). Exercise, nutrition and energy metabolism. McMillan Pub Co.
7. McArdle, W.D., Katch F.I., &Katch V. L. (1991). Exercise physiology – energy, nutrition and human performance (3rd ed). Philadelphia and London: Lea and Febiger.
8. Fisher, A.G., & Jensen C. R. (1990). Scientific basis of athletic conditioning. (3rd ed). Philadelphia and London: Lea and Febiger.
9. Shils, M. E., Olson J. A., & Shike, M. (1994). Modern nutrition in health and disease. (8th ed). Philadelphia and London: Lea and Febiger.
10. Wardlaw, G.M., &Insel P.M. (1993). Perspectives in nutrition. (2nd ed). St. Louis: Mosby.
11. Guyton, A.C., & Hall J. C. (1996). Text book of medical physiology. (9th ed). Bangalore: Prism Books (Pvt.) Ltd.

Course Type : Theory-Core IX	Course Title : INSTITUTIONAL FOOD SERVICE MANAGEMENT
Semester : VI	Course Code : U17ND609
Credits : 5	Hours / Week : 6

Course Outcomes

After completion of this course the students will be able to:

CO1 Obtain an in-depth knowledge about the layout of various areas in food establishments.

CO2 Understand the factors involved in selection and purchase of equipments and the base materials used in the manufacture of equipments.

CO3 Analyse the various types of food service systems and styles of service.

CO4 Relate the Indian menu pattern with the western world and the techniques in writing menu card.

CO5 Explain the duties of a purchasing officer, methods of purchasing and procedure to be followed while purchasing, receiving and storage.

CO6 Evaluate the quality standards of a recipe and their portioning.

CO7 Interpret the expenditure of the cost on food, labour and overhead expenses.

UNIT – I Menu Planning and Layout (18 Hours)

A. Broad categories, Types of food service systems, Study of layouts and floor plans. Food Plan Layout: Flow of work, characteristics of a typical food service layout, layout of food plants-space allocation for the various areas and flow of traffic through receiving, storage, preparation, service and dish washing areas; arrangements of equipments in work centers; optimum working heights.

B. Menu planning:

i. Types, Factors, Steps in menu planning.

ii. Planning menus for different patients in wards (eg. Pediatric, maternity), staff and visitors.

iii. Application of information technology (software)in Hospital food service establishments.

UNIT – II Equipment and Furnishings (18 Hours)

A. Classification of equipment, factors involved in selection of equipments; purchase of equipment, operational know-how, care and maintenance of equipments; dining room furnishings.

B. Materials Used: Base materials used in the manufacture of equipments, materials used for finishes, materials used in the manufacture of dining room furnishings.

UNIT III Food Service – Classification of Food Service According to Service (18 Hours)

A. Types of food service systems - Conventional systems, Commissary system, read prepared system and assembly –service system.

B. Styles of Service : Service of food-self-service, tray service, Waiter – Waitress Service and portable service, formal and informal service

C. Commercial and non commercial service system,

UNIT – IV Quantity Food Purchasing and Storage. (18 Hours)

A. Purchasing : Purchasing officer, duties, purchasing procedure, selection of supplier, methods of purchasing, purchase specifications.

(i) Receiving : Procedure and forms.

(ii) Storing and issuing : Objectives, types of store records, and stores issues.

B. Quantity Food Production and Service.

(i) Quality standards and control.

(ii) Standardisation of recipes

(ii) Portion control: Utilization of left over foods.

(iv) Ways and means of creating good atmosphere (Interior decoration)

(v) Informal and formal service styles (Table Service)

UNIT – V Cost Control (18 Hours)

A. Food Cost Control : Principles of food cost control, elements of cost- food cost, labour cost and overhead expenses; why good cost control; factors responsible for losses in a food

B. Service industry; methods of controlling goods costs leading to profit; costing of dishes, meals and events; methods of pricing items.

Topics for Self-Study

1. International serving style.

   https://djubo.com/blog/different-styles-service/

2. International cuisine.

   http://www.your4sure.com/popular-international-cuisines/#:

3. Basics of accounting.

   https://www.indeed.com/career-advice/career-development/basic-accounting#

4. Balance sheet basics.

   https://www.accountingverse.com/accounting-basics/how-to-make-a-balance-sheet.html

Text Books

1. Mohini Selti and Surjeet Malhan, "Catering Management–an integrated approach", Wiley Eastern Limited, New Delhi, 1987.
2. West, B.B., Wood, L., Harger, V.F. and Shugart, G., "Food Service in Institutions", John Wiley and Sons, New York, 1988.

Reference Books

1. Kotschevar, L. and Terrel, M.E, "Food Service Planning, Layout and Equipment", John Wiley and Sons, 1971.
2. Kotas, R and Davis, B., "Food Cost Control", McMillan & Sons, 1973.

Course Type : Theory-Elective II	Course Title : FOOD PRODUCT DEVELOPMENT AND MARKETING STRATEGY
Semester : VI	Course Code : U21ND6:3
Credits : 5	Hours / Week : 5

Course Outcomes:

After completion of this course the students will be able to:

CO1 Identify the basic principles and concepts of food product development (K2)

CO2 Analyze various cultural factors involved in the dietary pattern of various groups. (K4)

CO3 Discuss the steps involved in product development, portion size, cost calculation and nutritive value calculation. (K4)

CO4 Develop a new food product for different age groups. (K5)

CO5 Compare the market structure and develop practical skills in formulating and promoting the food product in a market. (K5)

CO6 Develop of the global trends in developing entrepreneur skills. (K6)

Unit – I Concepts of Product Development (15 hours)

Basic principles and concept of food product development, cultural approach to development of dietary pattern of various groups-language, linguistic, regional, religious (ethnic), Factors involved in food habit alteration, availability, importance and role of different research and development departments in food production industry.

Unit – II Market Process (15 hours)

Steps in product development-material resources based on market demand, standardization methods involved in product development. Portion size and portion control; Calculation of nutritive value and cost of production, shelf life and storage stability evaluation procedure of developed food products.

Unit – III Formula Development (15 hours)

Formulation of new food products for infants, preschool children, adolescents, pregnant and nursing mothers, old age, sports persons, armed sources personnel and therapeutic uses. Selection and training of judges,

Development of Score Card and analysis of data, Role of advertisement and Technologies in promotion of new products.

Unit – IV Government Proportion (15 hours)

Concept of market and marketing - approaches of study marketing and marketing functions, market structure, marketing efficiency and market integration, Role of Government in promoting agricultural marketing. Market promotion and positioning of food products.

Unit – V Sanitation (15 hours)

Conditions for sale, license and identification and quality processing, conditions for distribution, storage and sanitation, Studying the globalmarket status, Role of export promoting agencies, Economic feasibility of new products.

Topics for Self-study

1. Low cost recipes.

   https://vikaspedia.in/health/nutrition/nutritive-value-of-foods/low-cost-nutritious-supplements

2. Novel foods without preservatives.

   https://www.researchgate.net/publication/328283201_Novel_natural_food_preservatives_and_applications_in_seafood_preservation_A_review

3. Spirulina in food processing industry.

   https://www.longdom.org/proceedings/spirulina-arthrospira-platensis-as-food-a-commodity-to-better-feed-the-world-37470.html

4. Nutrigenomics in new product development.

   https://www.newfoodmagazine.com/article/77093/inspiring-the-food-of-tomorrow/

Text Books

1. Sudhir Gupta, “Handbook of Packaging Technology”, Engineers India Research Institute, New Delhi , (2017)
2. Khanaka, S.S., “Entrepreneurial Development”, S. Chand and Company Ltd, New Delhi, 2016.

Reference Books

1. Suja, R. Nair, "Consumer Behaviour and Marketing Research", 1st Edition, Himalaya Publishers, (2014).
2. Hmacfie, "Consumer led Food Product Development", Weedhead Publishing Ltd., UK, (2017)
3. Fuller, Gordon, W., "New Food Product Development", 2nd Edition, CRC Press, Boca Raton, Florida, (2015
4. Schaffner .D,J, Schroder , W.R. "Food Marketing and International Perspectives", Web/McGraw Hill , (2010)

Course Type : Practical-Core	Course Title : DIETETICS- II Practical & Dietary Internship
Semester : VI	Course Code : U17ND6P6
Credits : 2	Hours / Week : 45

Course Outcomes

Upon completion of the course, the students will be able to:

CO1 Identify the epidemiology of various diseases and plan diet accordingly. (K2)

CO2 Evaluate the need of each and every patient and plan diet according to their individual needs. (K5)

CO3 Plan and execute a diet for various disease conditions.k5

CO4 Acquire practical knowledge in hospitals by attending dietary internship. (K5)

CO5 Equip themselves in the field of dietetics and to approach different patients. (K5)

CO6 Develop the managerial skills in preparation of diet and supervision both professionally and personally. (K5)

Planning, Nutritive Value Calculation and Preparation Diet For…

1. Diabetes Mellitus-IDDM, NIDDM and Gestational Diabetes
2. Hypertension, atherosclerosis and congestive heart disease
3. Nephritis, nephrotic syndrome acute and chronic renal failure and nephrolithiasis.
4. Liver disease – cirrhosis, jaundice, hepatitis.
5. Cancer
6. AIDS

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2. Maimun Nisha, "Diet Planning for Disease", Kalpaz Pub, 2006.

3. Srilakshmi.V. "Dietetics", New age International Pub., New Delhi, 2011.