UNIVERSITY OF MUMBAI

No.UG/ICC/2016-17/ 125
MUMBAI- 400 032
3rd November, 2016

The Principal,
College of Home Science,
Nirmala Niketan,
49, New Marine Line,
MUMBAI- 400 020.

Madam,

I am to invited your attention to the Syllabi relating to the Bachelor of Science (Home Science) degree program **vide** this office Circular No. UG/146 of 2009, dated 8th May, 2016 and to inform you that the recommendation made by the Ad-hoc Board of Studies in Home Science at its meeting held on 30th May, 2016 has been accepted by the Academic Council at its meeting held on 24th June, 2016 **vide** item No.4.63 and that in accordance therewith, the revised syllabus as per the Choice Based Credit System for T.Y. B.Sc. Home Science (Branch I : Food Nutrition and Dietetics) (Sem.V&VI), which is available on the University's web site (www.mu.ac.in) and that the same has been brought into force with effect from the academic year 2016-17.

Yours faithfully,

(Dr.M.A.Khan)
REGISTRAR

A.C/4.63/24/06/2016

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AC 24/06/2016
Item no. 4.63

UNIVERSITY OF MUMBAI

Syllabus
for
SEMESTER V and VI
Program: B. Sc.
Course: Home Science
Branch I: Foods Nutrition and Dietetics
(Choice Based Credit System)
with effect from the academic year 2016–2017)

T.Y. B. Sc. (HOME SCIENCE)
BRANCH I: FOODS NUTRITION AND DIETETICS
SEMESTER V

Course Code	Title	Internal Assessment Marks	Semester End Examination	Total marks	Periods / week	Credits
USHSI501	Nutritional Biochemistry	40	60	100	3	3
USHSI502	Clinical Nutrition and Therapy	40	60	100	3	3
USHSI503	Food Microbiology and Preservation	40	60	100	3	3
USHSI504	Human Nutrition	40	60	100	3	3
USHSI505	Community Nutrition	40	60	100	2	2
USHSI506	Food Service Management	40	60	100	3	2
USHSIP501	Part A: Diet Therapy	__	50	50	4	2
	Part B: Community Nutrition	__	50	50	3	
USHSIP502	Part A: Food Analysis and Clinical Biochemistry	__	50	50	4	2
	Part B: Food Service Management	__	50	50	3	
				800	31	20

Course Code	Title	Periods/week	Marks	Credits
USHSI501	**Nutritional Biochemistry**	**3**	**100**	**3**

Objectives

- To enable the students to apply the knowledge of nutrition and role of nutrients in the body.
- To understand the chemistry, metabolism of the nutrients in the living system during health and disease.

Course Content		**Periods**
UNIT I	**Introduction to biomolecules** Types of chemical bonds, significance of asymmetric C atom Chemistry of Carbohydrates, classification, reactions of glucose and nutritional significance of the products: oxidation, reduction, enediol formation Disaccharides: structure and functions Oligosaccharides: structure and functions Polysaccharides: Homoglycans and Heteroglycans (structure of starch and cellulose only) Carbohydrate Metabolism Reactions of EMP, TCA (with structures), HMP, Gluconeogenesis (no structures), Glycogen metabolism (no structures), Homeostasis of blood glucose	**15**
UNIT II	**Protein Chemistry** Classification of amino acids, classification of proteins (both based on structure - function) Identification of N-terminal amino acid residue using Sanger's method, Edman's method, Bond stabilizing protein structure Four levels of protein organization, structure and functions of α-helical and β-pleated sheet structure, haemoglobin Protein metabolism General reactions of amino acids Detoxification of NH_3 Krebs-Hensleit cycle Inborn errors of Phenylalanine, Tyrosine Tryptophan	**15**
UNIT III	**Enzyme Chemistry** Definition, classification IUB (up to 1 digit), enzyme specificity, turnover number Units: Katal, IU Factors affecting enzyme activity Definition of km and significance Enzyme inhibition: Definition of Holoenzyme, Coenzyme, cofactor, Allosteric site, active site, prosthetic group, isoenzyme	**15**

References

Berg, Jeremy Mark, Tymoczko, John L and Stryer. (2002). *Biochemistry 5th Ed*. New York. W.H. Freeman and Co.

Brody Tom. (2004). *Nutritional Biochemistry 2nd Ed*. New Delhi. Elsevier/Reed, Elsevier. India Pvt. Ltd.

Chatterjee, M.N. Shinde and Rana. (2005). *Textbook of Medical Biochemistry*, 6th Ed. New Delhi, Jaypee Brothers. Medical Publisher.

Dandekar Sucheta P. (2002). *Medical Biochemistry (Prep Manual for U.G.) 2nd Ed*. New Delhi B-1 Churchill Livingstone Pvt. Ltd.

Rastogi S.C. (1993). *Biochemistry New Delhi*, Tata McGraw Hill Publishing Co. Ltd.

Course Code	Title	Periods/week	Marks	Credits
USHSI502	**Clinical Nutrition and Diet Therapy**	**3**	**100**	**3**

Objectives

- To impart the concept of modifying normal diets to therapeutic diets.
- To enable the students to understand the underlying disease conditions, possible complications and pathological states.
- To train students to plan appropriate nutrition intervention approaches and diets.
- To enable the students to focus on the preventive role of nutrition in the current life style situations.

Medical Nutrition therapy

Each of the diseases to be discussed under the following heads of Etiology, Pathophysiology, Diagnosis, and Management with special emphasis on nutritional care, Prevention

Course Content		Periods
Unit I	**Principles of diet therapy** Team work in nutritional care Rationale of nutritional modification necessary in disease conditions. Principles of Diet Therapy Review of Normal diet Standard hospital diet and its adaptation Overview of Nutritional Care process and counseling **Weight management** Regulation of food intake: Short term and Long term regulation, Set point theory Obesity and Overweight: Body weight components, Classification of obesity (gynoid/android and hypertrophy/hypersplasia, Etiology and assessment of obesity and prevalence in Indian situation, Complications of obesity. Management: Medical (Pharmacological), Nutrition and lifestyle, Surgical, Behavioural Juvenile Obesity Eating disorders: (Anorexia Nervosa and Bulimia), Management (Medical, Nutritional care), Psychological support and Prevention	**15**
Unit II	**Chronic Denegenerative Diseases** **Diabetes Mellitus** Definition, Etiology, Classification, long and short term complications, Diagnosis Management (Insulin Therapy, Dietary Management, Exercise, Pharmacological) Overview of special conditions: Diabetes in Childhood, Pregnancy, Role of Nutrition Education, Role of Nutrition in Prevention **Cardiovascular diseases** Prevalence, incidence, mortality with special reference to Indian situation. Patho- physiology and Management of Atherosclerosis, Endothelial dysfunction, Thrombosis, Angina Pectoris, Congestive cardiac failure. **Hyper-lipidemia**– classification, diagnosis and nutritional management **Hypertension**: Oetiology, Risk factors, Patho-physiology, Management **Metabolic syndrome** and role of nutrition in its prevention.	**15**
Unit III	**Dietary management involved in the following** **Inborn Errors of metabolism (**Phenylketomemia, Wilson's disease) **Bone health diseases** (Osteoporosis, Osteo and Rheumatoid Arthritis) **Chronic Obstructive Pulmonary Disease** **Cancer** **The hyper catabolic state; Surgery and Burns** **Neurological diseases** (Alzheimer's, Parkinson's disease and Epilepsy). **Nutrition in Allergies**	**15**

References

Antia F.P. (1997). *Clinical dietetics and nutrition* . (4th Ed.) New Delhi: Oxford University Press. Bennion, Marion; (1997). *Clinical nutrition.* (7th Ed.) New York: Harper and Row Publishers. Burton B.T. (1980). *Human nutrition.* (3rd Ed.) New Delhi: Tata McGraw Hill. Davidson and Passmore. *Human nutrition and dietetics*. (18 th Ed.) New Delhi: Tata McGraw Hill Publications. Garrow J.S. (1993). *Human nutrition and dietetics.* (9th Ed.) New York: Churchill Livingstone. Krause and Mahan. (1996). Foods, *nutrition and diet therapy.* (10th Ed.) Philadelphia: W.B. Saunders. Robinson: (1989). *Normal and therapeutic nutrition.* (7th Ed.) New York: Macmillan Pub. Company. Thomas Briony; (1995). *Blackwell Manual of Dietetic practise*. (2nd Ed.) Oxford: New York Scientific Publication:
Zeeman, Frances J. (1998). *Applications of clinical nutrition*. Englewood cliffs: Prentice Hall International Inc.

Course Code	Title	Periods/week	Marks	Credits
USHSI503	**Food Microbiology and Preservation**	**3**	**100**	**3**

Objectives

- To introduce students to the field of microbiology and its relevance to food deterioration and preservation.
- To impart knowledge regarding principles and techniques of preserving foods.
- To enable students to understand principles of hygiene and sanitation in a food industry.

Course Content		**Periods**
Unit I	**Major groups of microorganisms** Introduction to Bacteria, Yeast, Mold, Algae , Protozoa and Virus. Classification, morphology, reproduction and growth requirements of Bacteria, Yeast and Mold **Intrinsic and extrinsic parameters of foods that affect their microbiology** Intrinsic factors:-pH, moisture content, oxidation-reduction potential, nutrient content, antimicrobial constituents and biological structures. Extrinsic factors:-Temperature of storage, relative humidity of environment, presence and concentration of gases in the environment.	**15**
Unit II	**Microbial flora, spoilage, sources, characteristics and contamination in the following foods** Cereals and cereal products Pulses and Pulse products Vegetables and fruits Fish and other sea foods Meat , meat products and poultry Eggs Milk and milk products Processed and convenience foods **Non microbial deteriorative factors in foods other than microorganisms** Activities of food enzymes and other chemical reactions within food itself Infestation by insects, parasites and rodents Inappropriate temperature for a given food Gain or loss of moisture Reactions with oxygen Light Physical stress and abuse. Time	**15**
Unit III	**Use of food additives** Broad classes of intentional food additives (Preservatives, Antioxidants, sequesterants, surface active agents, stabilizers, thickeners, bleaching and maturing agents) **Use of fermentation technology** Benefits and mechanism of fermentation .Factors controlling fermentations in various foods Fermented products (Beer, Wine and soya-bean products)	**15**

References

Frazier, W. C. and Westoff, D. C. (1998) *Food Microbiology* New Delhi; Tata McGraw Hill

James, M. J. (1996) *Modern Food Microbiology* (4th Ed.) New Delhi: Published by S.K. Jain for C. B.S. Publishers and distributors.

Pelczar, M. J., Reid, R. D. and Chan (2000*) Microbiology*. New Delhi: Tata McGraw Hill.

Potter, N. H. and Hotchkiss, J. H. (1996) *Food Science*,(5th Ed.)New Delhi:C.B.S. Publishers and distributors. Subbulakshmi, G and Udipi, S. A. (2001) *Food Processing and Preservation*. New Delhi: New Age International Ltd. Publishers.)

Manay, N. S. and Shadaksharswamy, M. (2004) *Food Facts and Principles*, New Delhi: New Age International Ltd Publishers.

Course Code	Title	Periods/week	Marks	Credits
USHSI504	**Human Nutrition**	**3**	**100**	**3**

Objectives

- To reinforce the basic principles of nutrition
- To impart in-depth knowledge on the functions, deficiency and toxicity of macro and micronutrients.
- To enable the students to apply knowledge of nutrition to daily life.

Course Content		Periods
Unit I	**Energy** Definitions, Units of energy, Components of Energy Expenditure, Physical activity (light, moderate, and heavy) BMR and Thermal effect of food Computation of Energy requirements factorial approach Energy requirements for various groups of population Measurement of energy expenditure: Direct and Indirect **Carbohydrates** Classification Digestion and Absorption – an overview Dietary fibre; nutritional importance Glycemic load and Glycemic Index Factors influencing, Resistant Starch CHO Recommendation	**15**
Unit II	**Proteins** Classification and functions: Review of Proteins and amino acids Evaluation of Quality of Proteins: Biological and Chemical methods Amino Acid imbalances Protein requirements in various stages of life Assessment of protein nutritional status Protein Deficiency and Toxicity: concerns of protein supplementation.	**15**
Unit III	**Lipids** Overview of classification and functions of lipids and fatty acids Digestion and absorption EFA its importance and requirements Lipoproteins: Types and importance Trans-fats and their health effects MCTs their nutritional importance Requirement of fat in the diet and sources Consequences of deficiency and excess Interrelationship between Macronutrients Body composition through lifecycle Effects of over and under nutrition	**15**

References

Anderson, L., Dibble, M. and Mitchell, H. (1992) *Nutrition in health and disease,* 17th ed., J.B. Lippincott Co. Philadelphia

Bamji, M., Rao, P. N. and Reddy, V. *Textbook of Human Nutrition,* Oxford: IBH Pub. Co.

Davidson, S., Passmore, R., Brock, J and Truswell, A., (1975) *Human nutrition and dietetics*, 6th ed., ELBS Edinburgh.
Guthrie, H. (1986) *Introductory Nutrition*, 6th ed., Times Mirror/Mosby College Publication.
Robinson, C. and Lawler, M., (1982) *Normal and therapeutic nutrition*, 16th ed., Macmillan publishing Co. New York
Williams, S. (1981) *Nutrition and diet therapy*, 4th ed., Missouri: The C.V. Masby Co.

Course Code	Title	Periods/week	Marks	Credits
USHSI505	**Community Nutrition**	**2**	**100**	**2**

Objectives

- To create an awareness among students about the nutritional problems of the community with special emphasis on vulnerable sections.
- To understand the different methods of assessing nutritional status of the community.
- To recognize the deleterious effects of malnutrition in the development of our nation and means of combating the same.

Course Content		Periods
Unit I	Concept of community nutrition and malnutrition **Indicators of malnutrition** Infant mortality rate, Child Mortality Maternal mortality rate Birth rate Death rate **Identification of vulnerable groups** Pregnant women Nursing mother Infants, Children Special emphasis to girl child (including adolescents)	**10**
Unit II	**Unit II Assessment of Nutritional Status of a community** Part I **Anthropometry** Measurement of height, weight, head and chest circumferences, mid upper arm circumference, skin fold thickness, interpretation of measurements and comparison with standards (NCHS, ICMR), classification according to grades of malnutrition **Biochemical parameters for assessing nutrition status**	**10**
Unit III	**Assessment of Nutritional Status of a community Part II** Clinical signs and symptoms of PEM, mineral and vitamin deficiencies Diet Surveys and Sampling techniques Communication for behavioural change, planning, conducting, evaluating the nutrition education programmes	**10**

References

Beredict, A. (1997) *Preventive Nutrition – The Comprehension guide to health professionals* (Ed.) New Jersey : Huma. Press Inc.
Ebrahim G. J. (1983) *Nutrition in mother and child health* – London Mac Millan and Co.
Goel, S. L. (2001) *Community Health Care* (New Delhi) Deep and Deep Publication Goel,
S. L. (2001) *Community Health Care* (New Delhi) Deep and Deep Publication
Goel, S. L. (2001) *Health Care System and Management* Vol 1 – 4, New Delhi: Deep and Deep Publication
Goel, S. L. (2001) *Health Care System and Management.* Vol 1 – 4, New Delhi: Deep and Deep Publication
Gopaldas, T. Seshadri S. (1987) *Nutrition monitoring and assessment* Delhi: Oxford University Press.
Jelliffe, D. (1966) *The assessment of Nutritional Status of the Community*. Geneva
WHO. Osman, S. R. (1991) *Nutrition and Poverty (Ltd.)* Oxford; Oxford University
Press Rajlaxmi, R. (1981) *Applied Nutrition*, New Delhi: Oxford and IBH
Shukla, P. (1982) *Nutritional Problems of India*, New Delhi Prentice Hall of India.
Swaminathan, M. (1985) *Essential of Food and Nutrition* Vol I and II Bangalore, Bangalore Printing and Publishing Ltd.
Wadhwa, A and Sharma S. (2003) *Nutrition in the Community*, New Delhi: Elite Publishing House Pvt. Ltd.
Wadhwa, A. and Sharma S. (2003) *Nutrition in the Community*. New Delhi: Elite Publishing House Pvt. Ltd.

Course Code	Title	Periods/week	Marks	Credits
USHSI506	**Food Service Management**	**3**	**100**	**3**

Objectives

- To be aware of the scope of food service management in commercial and welfare organizations.
- To learn and develop skills in menu planning.
- To acquire knowledge about the process of food preparation and service.
- To understand concepts of marketing and entrepreneurship with reference to food service organizations.

Course Content		**Periods**
Unit I	Development and growth of the food service Industry Classification of food service operations Recent trends in food service Systems approach to food service organizations Types of food service systems Menu Planning Types of Menus Menu presentation, Writing, Design and format Menu Marketing	**15**
Unit II	Concept of Food flow Procurement, Concept of Market, Buyer, Vendor and Marketing Channel Purchasing: Methods of purchasing, purchasing process Receiving: Facilities needed for good receiving practices Storage and Inventory Production: Recipe formulation, Standardisation, Forecasting, Scheduling and control Energy Management and Conservation	**15**
Unit III	Kitchen Design and Layout Service Factors affecting the choice of distribution systems Styles of service and Service management Food Safety and hygiene Control of microbial quality of food throughout the food flow Food Handling and prevention of food borne illness Personal Hygiene Environmental Sanitation Waste disposal and pest control Standards for food safety and sanitation	**15**

References

Bhojwani M. (2007), *Food service management: Principles and practice*
Eckel P. J. (1985), *College and University Food Service Management*
Delfakis H, Nancy L, Van Burns J (1992), *Food Service Management*
Spears M. C ,Vaden A. E (1985), *Food Service Organizations—A management and systems approach* Drummond K. (1997) *Nutrition for the Food Service Personnel*
National Association Institute (1998) *Handbook for Food Service Management*
Verghese B (1999) *Professional Food and Beverage Service Management* Singh, Y. P. (2001) *Effective Food Management*
Fox A. (1971) *Hygiene and Food Production*

Course Code	Title	Periods/week	Marks	Credits
USHSIP501	**Part A: Diet Therapy**	**4**	**50**	**1**
	Part B: Community Nutrition	**3**	**50**	**1**

Part A: Diet Therapy

Objectives

- To familiarize the students with basic concepts of raw and cooked weights of foods the appropriate weights of measures and standardization procedures.
- To teach diet modification through use of food exchange lists and calculated values.
- To learn to plan therapeutic diets for management of clinical disease conditions.

Course Content		Periods
Unit I	Standardization of weights and measures -- dry and liquid Standardization of some recipes Cereal based/pulse based/milk based Vegetables/fruits/Miscellaneous	**15**
Unit II	Nutrient specific recipes (Calcium, Iron, Sodium, Protein, Fat, and High Fibre Weight management: Overweight, Obesity, Underweight, PEM	**15**
Unit III	Cardiovascular diseases	**15**
Unit IV	Diabetes Mellitus: Type I, Type II and Gestational DM	**15**

Part B: Community Nutrition

Objectives

- To acquire skills for the different methods in the assessment of nutritional status of the community.
- To prepare and use the various types of communication aids for imparting nutrition education.

Course Content		Periods
Unit I	**Seminars**	**15**
Unit II	**Nutrition education** Preparation of various audio visual aids-puppets, posters etc.	**15**
Unit III	Learning different techniques – demonstrations, story telling, skits, exhibitions	**15**

References

Gopaldas, T. Seshadri, S. (1987). *Nutrition monitoring and assessment*. Delhi. Oxford University Press. Jelliffe, D. (1966). *The assessment of nutritional status of the community*. WHO (Geneva). Swaminathan, M. (1985). *Essentials of food and nutrition*. *Vol. I and II*. Bangalore: Bangalore Printing and Publishing Ltd.

Course Code	Title	Periods/week	Marks	Credits
USHSIP502	**Part A: Food Analysis and Clinical Biochemistry**	**4**	**50**	**1**
	Part B: Food Service Management	**3**	**50**	**1**

Part A: Food Analysis and Clinical Biochemistry

Objectives

- To impart practical Skills in analytical procedures of foods and synthetic body fluids
- To enable students to understand the significance of various food components and biochemical parameters.
- To enable the students understand the principles of various analytical techniques.

Course Content		Periods
Unit I	Standardization of acids and alkalies, Redox titration. Qualitative analysis of carbohydrates. Quantitative estimation of total sugars in different foods by : Lane – Eynon's method, and Benedict's method Estimation of crude fibre. Estimation of blood glucose by Follin- wu.	**15**
Unit II	Qualitative analysis of amino acids. Quantitative estimation of protein by Macrokjeldhal (use of Kelplus). Use of paper chromatography for qualitative analysis of amino acids-demonstrations	**15**

	Estimation of Haemoglobin by : Sahli's method, Drabkins method Estimation of serum protein, A:G Ratio.	
Unit III	Identification of adulterants in different foods Microbial analysis of foods Techniques of sterilization and preparation of media	**15**
Unit IV	Microbial analysis of foods Plating technique and staining technique	**15**

References

Mayer, L.H. (1987). *Food Chemistry*. CBS Publishers and Distributors

Oser, L.B. (1976). *Hawk's physiological chemistry*. (14th Ed.) Tata McGraw Hill Pub. Co. Ltd. Pearson, D. (1970). *Chemical analysis of foods*. (6th Ed.) London: J. A. Churchill

Part B: Food Service Management

Objectives

- To enable students to understand the process of recipe planning
- To impart skills of preparing and presenting dishes

Course Content		**Periods**
Unit I	Menu Planning Standardisation of recipe, sourcing, analyzing and formulating a recipe Using a file card format to write the recipe Stepping up for quantity production Study of preparation and presentation of : soups, snacks	**15**
Unit II	Study of Preparation and Presentation of : Sandwiches, Salads, Mocktails.	**15**
Unit III	Study of preparation and presentation of Baked dishes – cakes and cookies, Baked Dishes –pies and soufflés Desserts and Sweets	**15**

References

Lillierap D.R. (1998). *Food and beverage service. (5th Ed.).* Elbs/Holder and Stoughton.

Morrison Paul. (1993). *Cost management for profitable food and beverage operations*. John Wiley and sons.

Verghese B. (1999). *Professional food and beverage service management*. Bangalore : Macmillan India.

T.Y. B. Sc. (HOME SCIENCE)
BRANCH I: FOODS NUTRITION AND DIETETICS
SEMESTER VI

Course Code	Title	Internal Assessment Marks	Semester End Examination	Total marks	Periods/ week	Credits
USHSI601	Nutritional Biochemistry	40	60	100	3	3
USHSI602	Clinical Nutrition and Therapy	40	60	100	3	3
USHSI603	Food Microbiology and Preservation	40	60	100	3	3
USHSI604	Human Nutrition	40	60	100	3	3
USHSI605	Community Nutrition	40	60	100	2	2
USHSI606	Food Service Management	40	60	100	3	2
USHSIP601	Part A: Diet Therapy	__	50	50	4	2
	Part B: Community Nutrition	__	50	50	3	
USHSIP602	Part A: Food Analysis and Clinical Biochemistry	__	50	50	4	2
	Part B: Food Service Management	__	50	50	3	
				800	31	20

Course Code	Title	Periods/week	Marks	Credits
USHSI601	**Nutritional Biochemistry**	**3**	**100**	**3**

Objectives

- To enable the students to apply the knowledge of nutrition and role of nutrients in the body.
- To understand the chemistry, metabolism of the nutrients in the living system during health and disease.

Course Content		**Periods**
Unit I	Nucleic acid Chemistry Structures of purines, pyrimidines, Nucleocides, Nucleotides, Disorders of purine metabolism DNA - 1°, 2°, 3°, W-C model Physical properties of DNA and T_m RNA – structure and types m-RNA, t-RNA, m-RNA, hn-RNA, sn-RNA Transcription, Translations in prokaryotes (E. coli) Brief outline of DNA replication in prokaryotes	**15**
Unit II	Lipid Chemistry Definition, classification of lipids. Simple, Compound i.e. Phospholipids, Lipoproteins, Sulfolipids, Glycolipids, Sphingolipids Derived Lipids: Fatty acids – EFA, w-3, w-6 Prostaglandins: biosynthesis, functions, inhibitors. Prostacyclins and Thromboxanes. Structure and functions of Cholesterol Lipid Metabolism Knoop's β-oxidation of even C fatty acid (no structures), ketone body formation and utilization Fatty acid biosynthesis of Palmitic acid (no structure) Lipid storage disorders	**15**
Unit III	Hormones Definition, classification, mode of action, Chemistry and functions of Thyroxine, Insulin, Catecholamines Disorders associated with the hormones Acid-Base balance Buffers: definition, types of buffers Role of lungs, kidneys and haemoglobin in Acid-Base balance Chloride shift Disorders of Acid-Base imbalance	**15**

References

Berg, Jeremy Mark, Tymoczko, John L and Stryer. (2002). *Biochemistry 5th ed*. New York. W.H. Freeman and Co.

Brody Tom. (2004). *Nutritional Biochemistry 2nd ed*. New Delhi. Elsevier/Reed. Elsevier. India Pvt. Ltd.

Chatterjee, M.N. Shinde and Rana. (2005). *Textbook of Medical Biochemistry, 6th ed*. New Delhi, Jaypee Brothers. Medical Publisher.

Dandekar Sucheta P. (2002). *Medical Biochemistry (Prep Manual for U.G.) 2nd ed*. New Delhi B-1 Churchill Livingstone Pvt. Ltd.

Rastogi S.C. (1993). *Biochemistry New Delhi*, Tata McGraw Hill Publishing Co. Ltd.

Course Code	Title	Periods/week	Marks	Credits
USHSI602	**Clinical Nutrition and Diet Therapy**	**3**	**100**	**3**

Objectives

- To impart the concept of modifying normal diets to therapeutic diets.
- To enable the students to understand the underlying disease conditions, possible complications and pathological states.
- To train students to plan appropriate nutrition intervention approaches and diets.
- To enable the students to focus on the preventive role of nutrition in the current life style situations.

Medical Nutrition therapy

Each of the diseases to be discussed under the following heads Each of the diseases to be discussed under the following heads of Etiology, Pathophysiology, Diagnosis, Management with special emphasis on nutritional care, Prevention

Course Content		Periods
Unit I	**Diseases of the G. I. System** GERD, oesophagitis, hiatal hernia Acute and chronic gastritis and peptic ulcer disease (gastric and duodenal) Gluten induced enteropathy Lactose intolerance Diarrhoea, constipation, flatulence Inflammatory bowel diseases **Nutritional Support**	**15**
Unit II	**Diseases of the Liver, Biliary system and Pancreas** Liver: Functions of the liver, Assessment of liver function, Viral Hepatitis (brief), Chronic and Fulminant hepatitis, Effects of Alcohol on liver (Alcohol liver disease, Cirrhosis, Hepatic encephalopathy, Liver Transplantation **Gall Bladder diseases:** Functions of Gall bladder, Cholelithiasis, Cholecystitis **Pancreatic diseases**: Function of pancreas, Pancreatitis (acute and chronic) **Nutrition and Immunity**.	**15**
Unit III	**Renal diseases:** Function of the kidney, Nephritis – acute and chronic, Nephrotic syndrome, Renal failure, ARF, CRF, Dialysis, Renal Transplant, Nepholithiasis (Calcium oxalate and uric acid stores) **Nutrition in infections**	**15**

References

Antia F.P. (1997). *Clinical dietetics and nutrition* . (4th Ed.) New Delhi: Oxford University Press. Bennion, Marion; (1997). *Clinical nutrition*. (7th Ed.) New York: Harper and Row Publishers. Burton B.T. (1980). *Human nutrition*. (3rd Ed.) New Delhi: Tata McGraw Hill.
Davidson and Passmore. *Human nutrition and dietetics*. (18 th Ed.) New Delhi: Tata McGraw Hill Publications. Garrow J.S. (1993). *Human nutrition and dietetics.* (9th Ed.) New York: Churchill Livingstone.
Krause and Mahan. (1996). *Foods, nutrition and diet therapy*. (10th Ed.) Philadelphia: W.B. Saunders.
Robinson: (1989). *Normal and therapeutic nutrition*. (7th Ed.) New York: Macmillan Pub. Company.
Thomas Briony; (1995). *Blackwell Manual of dietetic practise*. (2nd Ed.) Oxford: New York Scientific Publication:
Zeeman, Frances J. (1998). *Applications of clinical nutrition.* Englewood cliffs: Prentice Hall International Inc.

Course Code	Title	Periods/week	Marks	Credits
USHSI603	**Food Microbiology and Preservation**	**3**	**100**	**3**

Objectives

- To introduce students to the field of microbiology and its relevance to food deterioration and preservation.
- To impart knowledge regarding principles and techniques of preserving foods.
- To enable students to understand principles of hygiene and sanitation in a food industry.

Course Content		Periods
Unit I	**General Principles of Food Preservation:** Meaning, mode of action, and changes in foods **Techniques of food preservation** **Use of high temperature** (Heat Preservation) Degrees of heat preservation (blanching, pasteurization, canning, commercial sterilization); heat resistance of microorganisms (Thermal Death Time); selection of appropriate temperature. Protective effects of food constituents; methods used for heating food before and after packaging. **Use of ionizing radiations and microwave heating**: Ionising radiations and sources, units of radiation, radiation effects, mechanism of microwave heating, Application of radiation technology	**15**
Unit II	**Techniques of food preservation** **Use of low temperature (**Cold Preservation) Refrigeration and cool storage Requirements of refrigerated storage Freezing and frozen storage Freezing methods (Air Freezing, indirect contact freezing, immersion freezing) Changes in foods during refrigeration and frozen storage **Use of dehydration and concentration** Benefits and factors affecting heat and mass transfer Physical and chemical changes during dehydration and concentration. Methods and techniques used (Air convection, Drum driers and Vacuum driers) Use of various evaporators for concentration of foods	**15**
Unit III	**Packaging of foods** Functions and requirements of food packaging Types of containers Food packaging materials and forms Package testing. **Food laws and standards and systems** (National and International) HACCP and TQM used in controlling quality of foods	**15**

References

Frazier, W. C. and Westoff, D. C. (1998) *Food Microbiology* New Delhi; Tata McGraw Hill

James, M. J. (1996) *Modern Food Microbiology* (4th Ed.) New Delhi: Published by S.K. Jain for C. and distributors.

Pelczar, M. J., Reid, R. D. and Chan (2000*) Microbiology*. New Delhi: Tata McGraw Hill.

Potter, N. H. and Hotchkiss, J. H. (1996) *Food Science*, (5th Ed.)New and distributors.

Subbulakshmi, G and Udipi, S. A. (2001) *Food Processing and Preservation*, New Delhi: New Age International. Ltd Publishers.)

Manay, N. S. and Shadaksharswamy, M. (2004) *Food Facts and Principles*, New Delhi: New Age International Ltd Publishers.

Course Code	Title	Periods/week	Marks	Credits
USHSI604	**Human Nutrition**	**3**	**100**	**3**

Objectives

- To reinforce the basic principles of nutrition
- To impart in-depth knowledge on the functions, deficiency and toxicity of macro and micronutrients.
- To enable the students to apply knowledge of nutrition to daily life.

Course Content		Periods
Unit I	**Vitamins** Fat soluble (A, D, E and K) Water soluble vitamins (B-Complex and C) Chemistry, Metabolism, functions, RDA, deficiency and toxicity Effect of cooking and/or processing (wherever applicable)	**15**

Unit II	**Minerals** Macro-minerals (Ca, P, Na, K) Micro-minerals (Iron, Zn) Trace elements (Se, Cu) Metabolism, Functions, RDA, Deficiency and Toxicity of major and trace minerals Effect of processing/ Factors influencing absorption Inter-relationships between macro-nutrients and micro-nutrients	**15**
Unit III	**Sports nutrition** Metabolism of macronutrients and importance of micronutrients for sports persons Ergogenic aids, Nutritional problems Functional foods and phytochemicals	**15**

References

Anderson, L., Dibble, M. and Mitchell, H. (1992) *Nutrition in health and disease*, 17th ed., J.B. Lippincott Co. Philadelphia

Bamji, M., Rao, P. N. and Reddy, V. *Textbook of Human Nutrition*, Oxford: IBH Pub. Co.

Davidson, S., Passmore, R., Brock, J and Truswell, A., (1975) *Human nutrition and dietetics*, 6th ed., ELBS Edinburgh.

Guthrie, H. (1986) *Introductory Nutrition*, 6th ed., Times Mirror/Mosby College Publication.

Robinson, C. and Lawler, M., (1982) *Normal and therapeutic nutrition*, 16th ed., Macmillan publishing Co. New York

Williams, S. (1981) *Nutrition and diet therapy*, 4th ed., Missouri: The C.V. Masby Co.

Course Code	Title	Periods/week	Marks	Credits
USHSI605	**Community Nutrition**	**2**	**100**	**2**

Objectives

- To create an awareness among students about the nutritional problems of the community with special emphasis on vulnerable sections.
- To understand the different methods of assessing nutritional status of the community.
- To recognize the deleterious effects of malnutrition in the development of our nation and means of combating the same.

Course Content		**Periods**
Unit I	Trends in population growth and food production in India Strategies for augmenting food production Green, White, Brown and Blue revolution National guidelines on infant and young child feeding Per capita food availability and factors influencing it Problem of malnutrition in India and background factors responsible for it and its impact on National development Socio-economic Cultural and educational Food production and food availability Food consumption patterns Food storage and distribution Food based strategies for control of deficiencies	**10**
Unit II	Nutritional problems in India and relevant national health programmes. Vitamin A deficiency (Xeropthalmia – National programme for control of blindness Anaemia Osteoporosis and Rickets IDD – National Goitre Control programme PEM – National Nutrition Programme	**10**
Unit III	Nutritional education and nutritional intervention schemes/programs operating in India Nutrition intervention schemes, ICDS, midday meals Role of various national and international agencies in promoting nutrition and health status of the vulnerable sections of society e. g. FAO, WHCO, UNICEF, NIN, CFTRI, CARE.	**10**

References

Beredict, A. (1997) *Preventive Nutrition – The Comprehension guide to health professionals* (Ed.) New Jersey: Huma. Press Inc.
Ebrahim G. J. (1983) *Nutrition in mother and child health* – London Mac Millan and Co.
Goel, S. L. (2001) *Community Health Care* (New Delhi) Deep and Deep Publication Goel,
S. L. (2001) *Community Health Care* (New Delhi) Deep and Deep Publication
Goel, S. L. (2001) *Health Care System and Management* Vol 1 – 4, New Delhi: Deep and Deep Publication
Goel, S. L. (2001) *Health Care System and Management.* Vol 1 – 4, New Delhi: Deep and Deep Publication
Gopaldas, T. Seshadri S. (1987) *Nutrition monitoring and assessment* Delhi: Oxford University Press.
Jelliffe, D. (1966) *The assessment of Nutritional Status of the Community*. Geneva
WHO. Osman, S. R. (1991) *Nutrition and Poverty (Ltd.)* Oxford; Oxford University
Press Rajlaxmi, R. (1981) *Applied Nutrition*, New Delhi: Oxford and IBH
Shukla, P. (1982) *Nutritional Problems of India*, New Delhi Prentice Hall of India.
Swaminathan, M. (1985) *Essential of Food and Nutrition* Vol I and II Bangalore, Bangalore Printing and Publishing Ltd.
Wadhwa, A and Sharma S. (2003) *Nutrition in the Community*, New Delhi: Elite Publishing House Pvt. Ltd.
Wadhwa, A. and Sharma S. (2003) *Nutrition in the Community*. New Delhi: Elite Publishing House Pvt. Ltd.

Course Code	Title	Periods/week	Marks	Credits
USHSI606	**Food Service Management**	**3**	**100**	**2**

Objectives

- To be aware of the scope of food service management in commercial and welfare organizations.
- To learn and develop skills in menu planning.
- To acquire knowledge about the process of food preparation and service.
- To understand concepts of marketing and entrepreneurship with reference to food service organizations.

Course Content		Periods
Unit I	**Human Resource Management** Recruitment and Selection process Training and Development Performance Appraisal Personnel Actions Productivity Improvement Leadership and Motivation Labour Management Relations	**15**
Unit II	**Accounting Procedures** Financial Statements Tools used for analysis Cost control Budgeting **Marketing** Definition Marketing Cycle and mix Marketing for Food Service organizations Sales promotion in food Service organization	**15**
Unit III	**Entrepreneurship** Meaning of Entrepreneurship Characteristics/qualities of an Entrepreneur **Setting up a food service business**: Restaurant, Small catering enterprises, Innovative ideas for business Facilities needed to set up a business Sales and promotions of products/services Legal and financial issues	**15**

References

Barrow Colin, Brown Robert, Clarke Liz, (2006). *The Successful Entrepreneurs guide book*. London: Kogan and Page.

Shring S, Jardine R., Mills J. (2001). *Introduction to Catering*. India: Delmar – Thomson Learning Coltman Michael M. (2000). *Start and Run Profitable Restaurant*. Mumbai: Jaico Publishing House. Erdosh George (2000). *Start and Run a Profitable Catering Business*. Mumbai: Jaico Publishing House.

Course Code	Title	Periods/week	Marks	Credits
USHSIP601	**Part A: Diet Therapy**	**4**	**50**	**1**
	Part B: Community Nutrition	**3**	**50**	**1**

Part A: Diet Therapy

Objectives

- To familiarize the students with basic concepts of raw and cooked weights of foods the appropriate weights of measures and standardization procedures.
- To teach diet modification through use of food exchange lists and calculated values.
- To learn to plan therapeutic diets for management of clinical disease conditions.

Course Content		Periods
Unit I	Gastrointestinal Diseases Diseases of the upper GI tract Oesophagitis, GERD, Peptic duodenal ulcers, Lactose intolerance, Inflammatory Bowel Syndrome, Diarrhoea, Constipation and Flatulence	**15**
Unit II	Liver and Gall Bladder diseases Hepatitis, Cirrhosis, Alcoholic liver disease, Hepatic Encephalopathy	**15**
Unit III	Gall bladder diseases Cholcystitis, Cholelithiasis, Pancreatitis	**15**
Unit IV	Renal diseases Nephrotic syndrome, Nephritis, Dialysis and Renal Stones	**15**

References

Roth, R. A. and Townsend C. E. (2003), *Nutrition and Diet Therapy*. Thomson, Delmar Learning.
Whitney E.N. and Rolfes S.R. (2002) *Understanding Nutrition*. Wadsworth, Thomson Learning.
Thompson J. and Manore. M (2005). *Nutrition : An Applied Approach*. Benjamin hummings.
Aronson. V. (1986). *The Dietetic Technician*. CBI book, Van Nostrand Reinhold Company, New York.
Rolfes, Pinn and Whitney (2006). *Understanding Normal and Clinical Nutrition*. Thompson Wadsworth. Peckenpaugh. N. J. (2003) *Nutrition Essentials and Diet Therapy*. Saunders Publications.

Additional Reading

Mermel, V.L. (1995). Focus on Nutrition Mosby Publications.
Williams. S.R. (1993) Nutrition and Diet Therapy. Mosby Publication.

Part B: Community Nutrition

Objectives

- To acquire skills for the different methods in the assessment of nutritional status of the community.
- To prepare and use the various types of communication aids for imparting nutrition education.

Course Content		Periods
Unit I	**Assessment of nutritional status.** To learn techniques of measuring height, weight, head and circumference, chest circumference, mid upper arm circumference.	**15**
Unit II	Interpretation of results and comparisons with standards. Classification according to grades of malnutrition.	**15**
Unit III	**Visits** to various community centres-governmental and non-governmental	**15**

References

Gopaldas, T. Seshadri, S. (1987). *Nutrition monitoring and assessment*. Delhi. Oxford University Press. Jelliffe, D. (1966). *The assessment of nutritional status of the community*. WHO (Geneva).
Swaminathan, M. (1985). *Essentials of food and nutrition*. *Vol. I and II*. Bangalore: Bangalore Printing and Publishing Ltd.

Course Code	Title	Periods/week	Marks	Credits
USHSIP602	**Part A: Food Analysis and Clinical Biochemistry**	**4**	**50**	**1**
	Part B: Food Service Management	**3**	**50**	**1**

Part A: Food Analysis and Clinical Biochemistry

Objectives

- To impart practical skills in analytical procedures of foods and synthetic body fluids.
- To enable the students understand the significance of various food components and biochemical parameters
- To enable the students understand the principles of various analytical techniques.

Course Content		Periods
Unit I	Estimation of total fat in foods by Soxhlet method Analysis for chemical constants in lipids (Different oils): Iodine Value, Acid Value, Saponification value, Peroxide value Estimation of total cholesterol	**15**
Unit II	Estimation of moisture in foods Estimation of ash and preparation of ash solution Estimation of phosphorus	**15**
Unit III	Estimation of iron Estimation of calcium by Clark and Collip Estimation of Calcium by EDTA	**15**
Unit IV	Qualitative analysis of urine Estimation of urinary creatinine Estimation of vitamin C by dye method Estimation of Sodium and Potassium - use of fluorimeter and Flame photometer (demonstration)	**15**

References

Mayer, L.H. (1987). *Food Chemistry*. CBS Publishers and Distributors

Oser, L.B. (1976). *Hawk's physiological chemistry*. (14th Ed.) Tata McGraw Hill Pub. Co. Ltd. Pearson, D. (1970). *Chemical analysis of foods*. (6th Ed.) London: J. A. Churchill

Part B: Food Service Management

Objectives

- To learn the skills of planning, preparing and sell various types of cuisine
- To enable students to acquire skills of food service

Course Content		Periods
Unit I	**Planning Preparing and Selling** Indian Menu, Continental Menu, Oriental Menu	**15**
Unit II	**Study of:** Table Setting and Service Flower Arrangement Napkin Folding Fruit and Vegetable Carving	**15**
Unit III	**Demonstrations on** Table Setting and Service Napkin Folding Flower Arrangements Fruit and Vegetable Carving	**15**

References

Lillierap D.R. (1998). *Food and beverage service. (5th Ed.).* Elbs/Holder and Stoughton.

Morrison Paul. (1993). *Cost management for profitable food and beverage operations*. John Wiley and Sons.

Verghese B. (1999). *Professional food and beverage service management*. Bangalore : Macmillan India.

Scheme of Examination

The performance of the learners shall be evaluated into two parts. The learner's performance shall be assessed by Internal Assessment with 40% marks in the first part by conducting the Semester End Examinations with 60% marks in the second part. The allocation of marks for the Internal Assessment and Semester End Examinations are as shown below:-

Internal assessment for Theory 40 %

Sr. No.	Evaluation type	Marks
1	One class test/ case study / online examination to be conducted in the given semester	20
2	One assignment based on curriculum to be assessed by the teacher concerned	10
3	Active participation in routine class instructional deliveries	05
4	Overall conduct as a responsible learner, communication and leadership qualities in organizing related academic activities	05

Semester End Theory Examination of 60 marks (three unit courses)
Duration: These examinations shall be of two and half hours duration.
Theory question paper pattern:

- There shall be four questions each of 15 marks. On each unit there will be one question and fourth question will be based on entire syllabus.
- All questions shall be compulsory with internal choice within the questions. Each question will be of 30 marks with options.
- Questions may be sub divided into sub questions as a, b, c, d and e, etc and the allocation of marks depends on the weightage of the topic.

Semester End Practical Examination of 50 marks (three/four unit courses) No Internal Assessment Duration: These examinations shall be of three hours.

Sr. No.	Evaluation type	Marks
1	Laboratory work: **Semester End Examination**	40
2	Journal	05
3	Viva	05

Standard of Passing is as per the ordinances set by the University of Mumbai for the Credit based Semester and Grading System for the undergraduate courses.