Government of Karnataka

Curriculum Framework for Undergraduate Programme in Colleges and Universities of Karnataka.

1st and 2nd Semester Model Syllabus
for
BSc. in
Food Science & Nutrition

Submitted to
Vice Chairman
Karnataka State Higher Education Council
30, Prasanna Kumar Block, Bengaluru City University Campus,
Bengaluru, Karnataka – 560009

PREAMBLE

The objective of a B.Sc. program in Food Science and Nutrition emphasizes on the fundamentals of Food and Nutrition. As Food science is a far-reaching discipline that applies the pure science subjects of chemistry, biology and nutrition to the study of the nature, properties, and composition of foods, nutritional constituents, commodities, food quality and deterioration, food preservation, product development, basics of Human physiology, nutrition during lifetime, food hygiene and sanitation, food service management, quality control in food industries and food service institutions and functional foods as part of the syllabi. The program endeavors to provide students with broad-based knowledge and training in Food Science and Nutrition to provide a solid background of basic concepts as well as exposing them to the exciting advancements in the field. Theyare competent to explore the field of Food and Nutrition widening theirscope in areas of Food Industry, Nutritionist, Disease specific Therapist andmuch more.

The program aims to skill the students with knowledge of the field to gain profitable scopes in matters of career. The goal of the syllabus is to make the study of Food Science and Nutrition, interesting and encouraging to the students for higher studies including research and also to cater to theneeds of quality trained manpower with necessary professional skills in the food industry as well as health sector and to educate the workforce in the field of food science and nutrition. Electives provide add on knowledge which assist in their professional endeavor. The program is designed with theory papers, practical; project and internship that provide firsthand experience empowering students to be successful professionals.

Model Curriculum

Name of the Degree Program: M.Sc.

Discipline Core: Food Science and Nutrition

Total Credits for the Program: 265

Starting year of implementation: 2021-22

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

1. To impart in-depth knowledge in the area of Food, Nutrition and its relation to health.
2. To Understand human physiological process and importance of nutrients in metabolism
3. To train the students to be inquisitive and think in an innovative way
4. To impart holistic interdisciplinary education in Food Science and Nutrition
5. To train critical thinking, effective communication and social interaction
6. To develop health, ecological and environmental concerns
7. To impart basic and translational research skills with technical excellence and make them research and industry ready.
8. To prepare for higher degree with specializations, create professionals in different related areas, foster research & development, teaching, government and public service and entrepreneurship.

PROGRAM SPECIFIC OBJECTIVES

- Provide and equip students with understanding of food Science and nutrition with evidence-based approach
- Equip students with knowledge and understanding of modern aspects of nutritional

science and novel food usage

- Train on innovative recipe development applying the science of food
- Serve in core food industry, which leverages diverse food science domainsincluding food biotechnology, product development, safety & quality control.
- Harness the skills required to be an efficient entrepreneur
- Perform in applied nutrition fields including public health and diet therapy
- Build competent professionals in the field of food industry, health care sector to address societal & national needs
- Enable students to confidently pursue higher studies and research
- Gain an understanding to enable independency to access, analyze and plannutritional management for disease and critical condition
- Develop feasible solutions against major nutrition related health issues in country
- Develop confidence to implement nutrition education program in community
- Open a window in the field of food microbiology, quality control
- Create competitive nutritionists in various fields – hospitals, health care sectors,sports nutrition and food service institutions.

Contents of Courses for B.Sc. in FoodScience and Nutrition as Major Subject
Model II A

Semester	Course No.	Theory/ Practical	Credits	Paper Title	Marks	
					S.A.	I.A.
I	FSNT1.1	Theory	4	Human Physiology	60	40
	FSNP1.1	Practical	2	Human Physiology	25	25
	FSNT1.2	Theory	3	A) Fundamentals of Food Science B) Nutrition Education	60	40
II	FSNT2.1	Theory	4	Fundamentals of Human Nutrition	60	40
	FSNP2.1	Practical	2	Human Nutrition	25	25
	FSNT2.2	Theory	3	A) Healthy Lifestyle and Nutrition B) Culinary Science	60	40
Exit Option with Certificate in Food Science and Nutrition (52 Credits)						
III	FSNT3.1	Theory	4	Food Science	60	40
	FSNP3.1	Practical	2	Food Science	25	25
	FSNT3.2	Theory	3	A) Food Adulteration B) Basics of Dietetics	60	40
IV	FSNT4.1	Theory	4	Community Nutrition	60	40
	FSNP4.1	Practical	2	Community Nutrition	25	25
	FSNT4.2	Theory	3	A) Food Safety B) Nutrition Counseling	60	40
Exit Option with Diploma (100 Credits)						
V	FSNT5.1	Theory	4	Food Preservation	60	40
	FSNP5.1	Practical	2	Food Preservation	25	25
	FSNT5.2	Theory	4	Food Microbiology	60	40
	FSNP5.2	Practical	2	Food Microbiology	25	25
	FSNT5.3	Theory	4	Principles of Food Processing	60	40
	FSN DSE 5.1	Theory	3	A) Food and Nutrition Security B) Nutrition and Ayush C) Food Additives	60	40
	FSN Voc 5.1	T/P	3	A) Development of Cereal and Millet products B) Diet Counselling C) Baking and Confectionary Skills	60	40
VI	FSNT6.1	Theory	4	Food Product Development	60	40
	FSNP6.1	Practical	2	Food Product Development	25	25
	FSNT6.2	Theory	4	Elementary Dietetics	60	40
	FSNP6.2	Practical	2	Elementary Dietetics	25	25

Semester	Course No.	Theory/ Practical	Credits	Paper Title	Marks	
					S.A.	I.A.
	FSNT6.3	Theory	4	Food Quality Control	60	40
	FSN DSE 6.1	Theory	3	A) Sensory Evaluation B) Public Health Nutrition C) Functional foods and Nutraceuticals	60	40
	FSN Voc 6.1	T/P	3	A) Development of products from Pulses, Nuts and oil seeds B) Nutritional Assessment C) Food Service Management	60	40
Exit Option with Bachelor of Science, B.Sc. Degree (144 Credits)						

*In lieu of the research Project, two additional elective papers/ Internship may be offered

Abbreviation for FSNDSCT1.1 /FSNDSCP1.1

FSN – Food Science and Nutrition; DSC – Discipline Core; T – Theory/ P – Practical; 1 – First Semester; .1 – Course 1; PGFSNDSCT1.1: PG- Post Graduate; FSN- Food Science and Nutrition; DSC- Discipline Core; T- Theory 1 – First Semester; .1 – Course 1

Curriculum Structure for the Undergraduate Degree ProgramB.Sc Food Science and Nutrition

Total Credits for the Program: 265

Starting year of implementation: 2021-22

Name of the Degree Program: B.Sc.

Discipline/Subject: Food Science & Nutrition

Program Articulation Matrix:

This Matrix lists only the core courses. Core courses are essential to earn the degree in that discipline/subject. They include courses such as theory, laboratory, project, internships etc. Elective courses may be listed separately

Sem	Title / Name Of the course	Program outcomes that the course addresses (not more than 3 per course)	Pre-requisite course (s)	Pedagogy	Assessment
1	**DSC-I** **A1 (4+2)** Human Physiology	PO- 2 PO- 4	PUC/ 12th Science Stream	• Lectures • Demonstrations • Discussion	Formative and Summative Assessment
	OE-1 **3 Credits** **Culinary Science**	PO- 7	PUC/ 12th Science Stream	• Lectures • Demonstration • Discussion	Formative and Summative Assessment
2	**DSC-2** **A2 (4+2)** Fundamentals of Human Nutrition	PO- 2 PO- 5	DSC I and OE-1	• Lectures • Demonstration • Discussion	Formative and Summative Assessment
	OE-II **3 Credits** Healthy lifestyle and nutrition	PO- 2 PO- 5			

B.Sc. FOOD SCIENCE & NUTRITION
SEMESTER 1

Course Title: HUMAN PHYSIOLOGY	
Total Contact Hours: 60	**Course Credits:4**
Formative Assessment Marks: 40	**Duration of ESA/Exam: 02Hrs**
Model Syllabus Authors:	**Summative Assessment Marks: 60**

Course Pre-requisite(s): Students who have passed Pre-University Board of Examination or Equivalent board with science subjects are eligible for the undergraduatedegree B.Sc in Food Science and Nutrition.

Course Outcomes (COs):

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

- Gain the basic knowledge of human anatomy and physiology.
- Define the main structures composing human body.
- Explains structure and functions of cells, tissues and organs, systems of the humanbody
- Relates structure and functions of tissue.
- Provides excellent preparation for careers in the health professions and/or biomedical research.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-12)

Course Outcomes (COs) / Program Outcomes (POs)		1	2	3	4	5	6	7	8	9	10	11	12
Gain the basic knowledge of human anatomy and physiology		X											
Define the main structures composing human body		X											
Explains structure and functionsof cells, tissues and organs, systems of the human body		X											
Relates structure and functions of tissue.		X											
Provides excellent preparation for careers in the health professions and / or biomedical research.			X										

Title of the Course: HUMAN PHYSIOLOGY

Course: DSC 1	
Number of Theory Credits	**Number of lecture Hours/semester**
4	**60**

CONTENT	**60 Hrs**
Unit – 1 Introduction to Human Body	**14 hrs**
Chapter No. 1 Basic concepts of Organs, tissue and cell,	**4**
Chapter No. 2 Cellular organelles - structure and functions	**3**
Chapter No. 3 Blood - Composition, blood groups and Functions	**4**
Chapter No. 4 Structure and Functions of lymph System	**3**
Unit – 2 Cardiovascular System and Respiratory Systems	**14 hrs**
Chapter No. 5. Cardiovascular System - Structure and functions of heart, Properties of Cardiac Muscle and Functional Tissues.	**4**
Chapter No. 6. Cardiac Cycle, Heart Rate, Cardiac Output, Blood Pressure (Systolic & Diastolic Blood pressure), ECG	**3**
Chapter No. 7. Respiratory System - Physiological Anatomy of Respiratory Tract, Mechanism of Respiration,	**4**
Chapter No. 8. Transport of Respiratory Gases in Blood, Gaseous Exchange in Lungs and tissues	**3**
Unit – 3 Digestive System and Excretory Systems	**14 hrs**
Chapter No. 9. Digestive System- Principal organs of the digestive system: structure & function – Mouth (tongue, Teeth), Esophagus, Stomach, Small Intestine, Large Intestine	**5**
Chapter No. 10. Principal accessory organs: structure & function	**3**
– Salivary glands, liver, gall bladder, Pancreas	**3**
Chapter No. 11. Excretory System- Structure & Function – Excretory system, Kidney, Nephron	
Chapter No. 12. Urine Formation, Glomerular Filtration Rate (GFR), Composition of Urine.	**3**
Unit-4. Neuro-Endocrine System	**14 hrs**

Chapter No. 13. Endocrine Systems- Structure and Functions - Pituitary, Thyroid and Parathyroid, Adrenals and Gonads	**7**
Chapter No. 14. Endocrine Functions of Pancreas, Heart, Liver, Kidney	**2**
Chapter No. 15. Nervous System - Structure and functions of Neuron, Brain	**3**
Chapter No. 16. Central nervous system, peripheral Nervous System,	**2**

Practical: 2 Credits **60 Hrs**

1. Microscope and its uses
2. Histology of epithelial, connective, muscular and nervous tissues.
3. Enumeration of RBC and WBC count
4. Determination of pulse rate in resting condition and after exercise (30 beats /10 beats method)
5. Determination of blood pressure by Sphygmomanometer (Auscultator method).
6. Determination of Bleeding Time (BT) and Coagulation Time (CT).
9. Detection of Blood group (Slide method).
10. Measurement of Hemoglobin level (Sahli`s or Drabkin method).
11. Urine Analysis – Albumin & Glucose Test

References Books

- Chatterjee C.C (2016), Human Physiology Volume I, Medical Allied Agency, Kolkata
- Chatterjee C.C (2004), Human Physiology Volume II, Medical Allied Agency, Kolkata.
- Sembulingam, K. (2000) Essentials of Medical Physiology, Jaypee Brothers Medical Publishers(P) Ltd., New Delhi
- Chaudhri, K. (1993) Concise Medical Physiology, New Central Book Agency (Parentral) Ltd., Calcutta.
- Kathleen J. W. Wilson, Anne Waugh, Allison Grant. Ross and Wilson Anatomy (2014),
- Physiology in Health and Illness. 12th Edition, Elsevier Publication, New Delhi
- Jain A K (2012) Text Book of Physiology volume 1 and Vol.2, APC publicationsNew Delhi.

Date **Course Co-ordinator** **Subject Committee Chairperson**

B.Sc. FOOD SCIENCE & NUTRITION
SEMESTER 1

Course Title: CULINARY SCIENCE (OE- 1)	
Total Contact Hours: 60	**Course Credits:4**
Formative Assessment Marks: 40	**Duration of ESA/Exam: 02Hrs**
Model Syllabus Authors:	**Summative Assessment Marks: 60**

Course Pre-requisite(s): Students who have passed Pre-University Board of Examination or Equivalent board with science subjects are eligible for the undergraduatedegree B.Sc in Food Science and Nutrition.

Course Outcomes (COs):

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

1. Gain knowledge on aims and objectives of cooking
2. Understand the Conservation of nutrients and their importance to life
3. Understand the personal hygiene; environmental Hygiene; food storage and causes of contamination

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-12)

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12
Gain knowledge on aims and objectives of cooking		X										
Understand the Conservation of nutrients and their importance to life	X											

B.Sc. FOOD SCIENCE & NUTRITION
SEMESTER 1
Title of the Course: CULINARY SCIENCE

Course: OE 1	
Number of Theory Credits	**Number of lecture Hours/semester**
3	**45**

CONTENT	**45 Hrs**
Unit – 1 Introduction to cookery	**15 hrs**
Chapter No. 1 Culinary history, aims and objectives of cooking- Origin of modern cookery; Continental cuisine: Indian cuisine	**3 Hrs**
Chapter No. 2 Pre- processing of foods- Techniques used in pre-preparation, advantages and disadvantages	**2 Hrs**
Chapter No. 3 Methods of cooking- Methods of heat transfer; Classification; Moist heat methods; Dry heat methods; fat as cooking media, Conservation of nutrients	**5 Hrs**
Chapter No. 4 Personal Hygiene; Environmental Hygiene; Food storage and causes of contamination; Food borne illnesses; Food poisoning; Garbage disposal	**5 Hrs**
Unit – 2 Food groups and their nutritional value	**15 hrs**
Chapter No. 5. Cereals, pulses, fats and oils	**5 Hrs**
Chapter No. 6. Fruits and Vegetables	**3 Hrs**
Chapter No. 7. Animal foods and its products	**3 Hrs**
Chapter No. 8. Spices and condiments	**4 Hrs**
Unit – 3 Role of ingredients in cookery and methods of food service	**15 Hrs**
Chapter No. 9 Types & Uses: Fats and Oils, Salt, Raising Agents, Thickening Agents, Herbs, Flour, Rice, Cereals, Pulses, Milk and Milk Products	**5 Hrs**
	3 Hrs
Chapter No. 10 Uses of sugar and eggs in cookery- bakery and confectionery	**3 Hrs**
Chapter No. 11 Preserved products- jam, jelly, juice, pickle, sauce, ketchup etc	**4 Hrs**

Chapter No. 12 Dining services methods, techniques & styles	

REFERENCE

1. Food & Beverage Service – R. Singaravelavan - Oxford University Press
2. Food & Beverage Service - Dennis Lillicrap, John Cousins – Bookpower
3. Food & Beverage – F & B Simplified – Vara Prasad & R. Gopi Krishna – Pearson
4. Food & Beverage Service - Vijay Dhawan
5. The Steward - Peter Dias
6. The Waiter - John Fuller & A.J. Currie – Shroff Publishers
7. Parvinder S Bali, International Cuisine and food production management, 2012
8. Avantina Sharma, text book of food science and technology, CBS publication, 2019

Date **Course Co-ordinator** **Subject Committee Chairperson**

B.Sc. FOOD SCIENCE & NUTRITION
SEMESTER 2

Course Title: FUNDAMENTALS OF HUMAN NUTRITION (DSC-A2)	
Total Contact Hours: 60	**Course Credits:4**
Formative Assessment Marks: 40	**Duration of ESA/Exam: 02Hrs**
Model Syllabus Authors:	**Summative Assessment Marks: 60**

Course Pre-requisite(s): Students who have passed Pre-University Board ofExamination or Equivalent board with science subjects are eligible for the undergraduate degree B.Sc in Food Science and Nutrition.

Course Outcomes (COs):

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

- Knowledge in aspects of nutrition & functions of food in healthy life sustenance
- Understand function of nutrients, dietary sources, consequences of deficiency and excess
- Understand the food composition and concept of energy balance
- Knowledge and understanding role of water in diet

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-12)

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12
Knowledge in aspects of nutrition & functions of food in healthy life sustenance	X											
Understand function of nutrients, dietary sources, consequences of deficiency and excess	X											
Understand the food composition and concept of energy balance					X							
Knowledge and understanding role of water in diet									X			

B.Sc. FOOD SCIENCE & NUTRITION
SEMESTER 2

Title of the Course: FUNDAMENTALS OF HUMAN NUTRITION

Course: DSC-A2	
Number of Theory Credits	**Number of lecture Hours/semester**
4	**60**

CONTENT	**60 Hrs**
Unit – 1 Definition of food, nutrition, health	**15 Hrs**
Chapter No. 1: Introduction : Food & its relation to health, Objectives in the study of nutrition	**4 Hrs**
Chapter No. 2: Energy –Definition, forms of energy, units of measurement, physiological fuel vales of energy, determination of energy value of foods	**4 Hrs**
Chapter No. 3: BMR – definition, Determination and factors affecting, Factors affecting energy requirements, diet induced thermogenesis (SDA)	**4 Hrs**
Chapter No. 4: Water: Functions, requirements, sources	**3 Hrs**
Unit – 2 Macro Nutrients	**15 hrs**
Chapter No. 5: Protein -Classification, functions, Digestion& absorption (in brief), RDA, sources and deficiencies	**4 Hrs**
Chapter No. 6: Carbohydrate - Classification, functions, Digestion & absorption (in brief), RDA, sources and deficiencies	**5 Hrs**
Chapter No. 7: Fat-Classification, functions, Digestion & absorption (in brief), RDA, sources and deficiencies	**3 Hrs**
Chapter No. 8: Dietary fiber- types and functions	**3 Hrs**
Unit - 3Micronutrient – Vitamins and Minerals	**15 hrs**
Chapter No. 9: Fat-soluble Vitamins (A, D, E & K)- Function, RDA, sources and deficiency and excess.	**4 Hrs**
Chapter No. 10:. Water soluble vitamins: Thiamin, Riboflavin, Niacin, B12, Folic acid, Biotin and Vitamin C: functions, RDA, food sources, deficiencies and excess.	**4 Hrs**
Chapter No. 11: Macro minerals- Calcium, Phosphorus and magnesium, Sodium, Potassium, Chlorine: Functions, absorption, RDA, sources and deficiencies.	**5 Hrs**
Chapter No. 12: Micro Minerals- Iron, Zinc, Fluorine and Iodine: function, absorption, RDA, sources and deficiency.	**2 Hrs**

Unit – 4 Nutritional management	15 hrs
Chapter No.13 : Definition, importance of balanced diet, RDA for various nutrients - age, gender, physiological state, food group system, factors affecting meal planning,	**4 Hrs**
Chapter No.14 : Nutritional deficiency diseases -Causes, symptoms, treatment, Protein Energy Malnutrition (PEM), Vitamin A Deficiency (VAD), Iron Deficiency Anemia (IDA), Iodine Deficiency Disorders (IDD), Zinc Deficiency, Fluorosis.	**5 Hrs**
Chapter No.15: National Nutrition Policy and Program - Integrated Child Development Services (ICDS) Scheme, Mid-day Meal Program (MDMP), National programs for prevention of Anemia, Vitamin A deficiency, Iodine Deficiency Disorders.	**3 Hrs**
Chapter No.16: National and International agencies in uplifting the nutritional status -WHO, UNICEF, CARE, ICMR, ICAR, CSIR, CFTRI. Various nutrition related welfare program, ICDS, SLP, MOM, and others (in brief).	**3 Hrs**

PRACTICAL: 2 Credits **60 Hrs**

1. Weights and measures –Household and standard measures used in food science laboratory..
2. Calculation of mean nutritive value of foods
3. Standardization of recipes.
4. Recommended Dietary Allowances/Nutritive values of foods.
5. Enhancing the traditional recipes with specific nutrients (protein, carbohydrate, fat, vitamin A, vitamin C, calcium and iron).

Reference:

1. Food & Nutrition - Dr. M. Swaminathan
2. Food facts & principles – Manay & Shadakshara Swamy
3. Food science – Sumathi Mudambi
4. Fundamentals of food and nutrition, Mudambi & Rajgopal 4th edition 2001
5. Principles of Food Science by Borgstrom and Macmillon
6. Food Science by Potter & Hotchkiss Judith E. Brown, Nutrition Now, 3 rd edition. Wads worth, Thomas learning, 10 Davis drive Belmont C A 94002-3098 USA, 2002
7. Barbara A. Bowmaw and Robert M. Russell, Nutrition, Eighth Edition, ILSI press, Washington, DC, 2001.
8. C. Gopalan, B.V. Ramasastri and S.G. Balasubramaniam, Nutritive value of Indian foods, NIN, ICMR, Hyderabad, 500007, INDIA, 2007.
9. Mehtab S Bamji, N Pralhad Rao, Vinod Reddy, Text Book of Human Nutrition, oxford IBH publishing Co. Pvt. Ltd., New Delhi, Calcutta.

10. Sir Stanley Davidson, R Passmore, Human Nutrition and Dietetics. The English language book society and Churchill hivingstome 1969.
11. Kathleen Mahan L., Sylnia Escott-Stump, Krause's food, nutrition and diet therapy (11th edition). Saunders Company, London.
12. Passmore R. and Davidson S. (1986) Human nutrition and Dietetics. Liming stone publishers.
13. Shil's M.E., Alfon J.A., Shike M (1994), Modern nutrition in health and diseases eighth edition.
14. William S.R., Nutrition and Diet Therapy fourth edition C.V. Mos Company

Date **Course Co-ordinator** **Subject Committee Chairperson**

B.Sc. FOOD SCIENCE & NUTRITION
SEMESTER 2

Course Title: Healthy lifestyles and Nutrition (OE- 2)	
Total Contact Hours: 45	**Course Credits: 3**
Formative Assessment Marks: 40	**Duration of ESA/Exam: 03Hrs**
Model Syllabus Authors:	**Summative Assessment Marks: 60**

Course Pre-requisite(s): Students who have passed Pre-University Board ofExamination or Equivalent board with science subjects are eligible for the undergraduate degree B.Sc in Food Science and Nutrition.

Course Outcomes (COs):

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

- Gain knowledge on healthy life styles
- Understand the relationship between different nutrients and their importance
- Understand the personal hygiene; environmental Hygiene

Course Articulation Matrix: Mapping of Course Outcomes (COs) withProgram Outcomes (POs 1-12)

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12
Gain knowledge on Healthy Life styles		X										
Understand the relationship between different nutrients and their importance	X											
Understand the personal hygiene; environmental Hygiene						X						

B.Sc. FOOD SCIENCE & NUTRITION
SEMESTER 2

Title of the Course: HEALTHY LIFE STYLE AND NUTRITION

Course: OE-2	
Number of Theory Credits	**Number of lecture Hours/semester**
3	**45**

CONTENT	**45 Hrs**
Unit – 1 INTRODUCTION TO FOOD AND NUTRITION	**15 Hrs**
Chapter No. 1: History of nutrition, Relationship of food and health	**3 Hrs**
Chapter No. 2: Factors influencing food intake & food habits: Physiologic Factors that determine food intake, Environmental & behavioral factors influencing food acceptance	**3 Hrs**
Chapter No. 3: Energy and macronutrients – Carbohydrates, Protein, Fat - functions, sources deficiency disorders and recommended intakes.	**4 Hrs**
Chapter No. 4: Micronutrients: Minerals – calcium, Iron, Iodine, and other elements, Vitamins – Fat Soluble & Water Soluble.	**5 Hrs**
Unit – 2 Nutrition for life cycle	**15 hrs**
Chapter No. 5: Nutritional assessment - direct and indirect methods	**4 Hrs**
Chapter No. 6: Nutritional requirements for pregnancy and lactation	**3 Hrs**
Chapter No. 7: Nutritional requirements for growing children	**4 Hrs**
Chapter No. 8: Nutritional requirements for adult and elderly	**4 Hrs**
Unit – 3 PLANNING OF DIET	**15 Hrs**
Chapter No. 9: Basic principles of planning diet, Dietary guides and balanced diets**.**	**3 Hrs**

Chapter No. 10: Principles of planning a normal diet: characteristics of a normal diet, meeting nutrient requirements of individuals and family. Use of Dietary guidelines for Indians.	**3 Hrs**
Chapter No. 11:Objectives of diet therapy- Regular diet and rationale for	**4 Hrs**

modifications in energy and other nutrients, texture, fluid, soft diets etc. **Chapter No. 12:**Nutrition for health and fitness- Role of nutrition in fitness, Nutritional guidelines for health and fitness, Nutritional supplements, Importance and benefits of physical activity	**5 Hrs**

Reference

1. Food & Nutrition - Dr. M. Swaminathan
2. Srilaksmi. B. Nutrition Science. New age international Pvt. Ltd. New Delhi, 2001.
3. Robinson C. H. Basic Nutrition and Diet therapy, McMillan Pub.co, New York, 1989
4. Food facts & principles – Manay & Shadakshara Swamy
5. Food science – Sumathi Mudambi
6. Fundamentals of food and nutrition, Mudambi & Rajgopal 4th edition 2001
7. Barbara A. Bowmaw and Robert M. Russell, Nutrition, Eighth Edition, ILSI press, Washington, DC, 2001.
8. C. Gopalan, B.V. Ramasastri and S.G. Balasubramaniam, Nutritive value of Indian foods,NIN, ICMR, Hyderabad, 500007, INDIA, 2007.
9. Seth V and Singh K (2006). Diet Planning through the Life Cycle: Part 1 Normal Nutrition. A Practical Manual. Elite Publishing House Pvt. Ltd. New Delhi.
10. Chadha R and Mathur P eds. Nutrition: A Lifecycle Approach. Orient Blackswan, New Delhi.2015

Date **Course Co-ordinator** **Subject Committee Chairperson**