

**Manonmaniam Sundaranar University, Tirunelveli.**  
**PG Courses – Affiliated Colleges**  
**Course Structure for M.Sc. Dietetics and Food Management**  
**(Choice Based Credit System)**  
**(with effect from the academic year 2021- 2022 onwards)**

**INTRODUCTION:**

Outcome-Based Education is incorporated into the curriculum based on the requirements of NAAC and UGC – Quality Mandate (2018). To fulfill these requirements, the Programme Educational Objectives (PEOs), Programme Outcomes (POs) and Programme Specific Outcomes (PSOs) and Course Outcomes (COs) were framed for all programmes in alignment with the Vision, Mission and Educational Objectives of the University.

**VISION AND MISSION OF THE UNIVERSITY:**

**VISION:**

To provide quality education to reach the un-reached.

**MISSION:**

- To conduct research, teaching and outreach programmes to improve conditions of human living.
- To create an academic environment that glorify women and men of all races, caste, creed, cultures and all atmosphere that values intellectual curiosity, pursuit of knowledge , academic freedom and integrity.
- To offer a wide variety of campus educational and training programmes, including the use of information technology to individuals and groups.
- To develop partnership with industries and government so as to improve the quality of work place and to serve as catalyst for economic and cultural development.
- To provide quality / inclusive education especially for the rural and unreached segments of economically downtrodden students including women, socially oppressed and differently abled.

**PREAMBLE:**

The post graduate programme in this discipline has been designed to provide the students intensive and extensive theoretical and experiential learning. The programme allows flexibility in the choices based

credit systems. It is envisaged that the current of thrust areas, which students can select, based require trained professionals in areas such as Public Nutrition, Dietetics and Clinical Nutrition, Institutional Food Administration as well as Food Science and Quality Control.

<b>Sem.</b>	<b>Sub. No.</b>	<b>Subject Status</b>	<b>Subject Title</b>	<b>Contact Hrs./ Week</b>	<b>Credits</b>
I	1	Core - 1	Biochemical Techniques	6	4
	2	Core - 2	Clinical Dietetics - I	6	4
	3	Core - 3	Advanced Food Science and Chemistry	5	4
	4	Core -4	Food Microbiology and Safety	5	4
	5	Core - 5 Practical - 1	Biochemical Techniques	4	2
	6	Core - 6 Practical – 2	Clinical Dietetics - I	4	2
II	7	Core – 7	Applied Human Physiology	5	4
	8	Core – 8	Clinical Dietetics - II	5	4
	9	Core – 9	Functional Foods and Nutraceuticals	4	4
	10	Core -10	Food Product Development and Marketing	4	4
	11	Core – 11	Field Work	4+	3
	12	Core - 12 Practical - 3	Applied Human Physiology	4	2
	13	Core - 13 Practical - 4	Clinical Dietetics -II	4	2

<b>Sem.</b>	<b>Sub. No.</b>	<b>Subject Status</b>	<b>Subject Title</b>	<b>Contact Hrs./ Week</b>	<b>Credits</b>
	14	Core -14	Nutritional Biochemistry	5	4
III	15	Core - 15	Food Processing and Preservation	6	4
	16	Core - 16	Community Nutrition	6	4
	17	Core -17	Research Methodology	5	4
	18	Core – 18 Practical - 5	Community Nutrition	4	2
	19	Core – 19 Practical - 7	Food Processing and Preservation	4	2
IV	20	Core – 20	Human Factors & Ergonomics	4	4
	21	Core – 21	Food Quality Control	4	4
	22	Core – 22	Nutrition For Fitness	4	4
	23	Core - 23 Practical - 7	Food Quality Control Practical	4	2
	24	Core - 24 Practical - 8	Internship Training	4	2
	25	Elective - 4	Field Work / Study Tour	3+	3
	26	Core - 20	Project	7+	8

### **ELIGIBILITY FOR ADMISSION:**

- ❖ All students admitted to the programme should have science background.
- ❖ The candidates should have completed 10, +2 with science, Food and Nutrition, Bio-chemistry, Food Technology or composite / General Home Science at B.Sc. level.

### **DURATION OF THE PROGRAMME:**

The students shall undergo the prescribed programme of study for a period of not less than two academic years (four semesters). Each semester contains 90 working days.

### **MARK ASSESSMENT:**

There is a separate passing minimum for the external and overall components. Distribution of marks between **Internal** and **External** Assessment are

**For Theory: 25 : 75**

**For Practical: 50 : 50**

**Passing minimum of 40% for external and overall components.**

**Internal Marks for Theory (Core Theory, Core Practical, Elective,) shall be allotted in the following:**

The average of the best two from three compulsory tests.

Each test is of one hour duration for **15** Marks

Assignment- **10** Marks

Total-**25** Marks

**Internal Marks for Practical (continuous assessment) shall be allotted in the following manner:**

Experimental Work-**25** Marks; Regularity-**25** Marks; Total- **50** Marks

**QUESTION PATTERN: (EXTERNAL)**

**THEORY**

**Time: 3 hrs**

**Maximum: 75 marks**

Question paper will consist of

**Part-A: Q. No: 1- 10**

Objective type (2 questions from each unit) (10x1=10 marks)

**Part-B: Q. No: 11- 15**

Descriptive – short answer (Internal choice from each unit-2 questions for each)

(5x5=25 marks)

**Part-C: Q. No : 16- 20**

Essay type Questions (Internal choice from each unit- 2 question for each)

(5x8=40 marks)

**Food Quality Control**

**Time: Three hours**

**Maximum: 75 marks**

**10 × 1 = 10 marks**

**Answer ALL questions.**

**Choose the correct answer:**

**PART A**

- Which of the following is not true about mercury in food?  
(a) Taken as methyl mercury (b) Hearing loss (c) High amount can damage CNS (d) Causes nausea
- \_\_\_\_\_ is a mycotoxin  
(a) Aflatoxin (b) Patulins (c) Penicillic acid (d) All the above
- Two important international agencies of food standards are  
(a) FDA/CARE (b) CARE/FAO (c) WHO/IAU (d) CRAS/ICAR
- Metallic contamination is common in  
(a) Packed foods (b) Canned foods (c) Wrapped foods (d) Rolled foods
- One of the following is the natural colouring substances used in food preparations  
(a) Annato (b) Cheese (c) Vinegar (d) Cocum
- Trypsin inhibitors are present in  
(a) Cotton (b) Soybean (c) Ragi (d) Rice

7. Protease inhibitors compounds include ----- plant foods  
 a. green leafy vegetables b. cereals c. legumes d. Pulses
8. Sampling theory is essentially based on -----  
 a. defects b. regularity and optimization c. including tables d. reduce waste
9. How many laws works under the enforcement of FSSAI  
 a) Two b) eight c) five d) more than eight
10. Which chemical used for ghee adulteration  
 a. con. Hydro chloric acid b. con. sulphuric acid c. Nitric acid

**Part B**

**5 × 5 = 25 Marks**

**Answer ALL questions, choosing either (a) or (b),**

11. a) Define Evaluation. Give the advantages of subjective method of evaluation?

OR

b) What are aflatoxins? Describe the types and its effects.

12. a) Elucidate AGMARK? Explain its functions

OR

b) Describe the sources and effects of naturally occurring food toxicants.

13. a) Describe the hazards of additives and its safety limits

OR

b) Brief about standards and label's specifications

14. a) Explain about the veterinary drug residue

OR

b) Explain about the preservatives

15. a) Illustrate on food additives

OR

b) Discuss the types of food additives?

**PART - C**

**5 × 8 = 40 marks**

**Answer ALL questions, choosing either (a) or (b),**

16. a) Elaborately discussed about FPO & BIS.

OR

b) Explain the tests used to detect the common food adulterants in any four foods

17. a) Explain about DUO-Trio test..

OR

b) Elaborate notes on paired comparison test.

18.a) Give the harmful effects of metallic contamination

OR

b) Explain the significance and objectives of organic residues in food materials.

19. a) Give an account of BIS

OR

b) Enumerate the role national food laws.

20.a) Describe notes on evaluation card

OR

b) Briefly explain about the environmental contamination

### **PRACTICAL**

**Time: 3 hrs**

**Maximum: 50 marks**

Major Practical

– 15 marks

Minor Practical

– 10 marks

Identification (Spot tests) - 20 marks

Observation Note - 05 marks

Total

- 50 marks

### **PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)**

The M.Sc., Dietetics and Food Management Programme will enable the students to

### **PROGRAMME OUTCOME**

**PO1** Provide academic, research institutions and Disciplinary Knowledge.

**PO2** Equip hospitals, food services institutions and industry.

**PO 3** Apply planning, monitoring and evaluation of nutrition and health programmes, Scientific Reasoning and Problem Solving.

**PO4** Apply critical thinking skills to develop new food products and Analytical Reasoning.

**PO5** Achieve practical proficiency to work efficiently in food analysis laboratories, Digital Literacy, Self directed and Lifelong learning.

**PO6** Work in teams to develop communication skills and adopt good manufacturing, Cooperation/Team Work and Multi-Cultural Competence.

**PO7** Practice in food industries, Develop ability to undertake diverse and challenging career opportunities in food industries and Moral and Ethical awareness.

## **PROGRAMME SPECIFIC OUTCOMES**

The students of M.Sc. Dietetics and Food Management programme will be able to

PSO 1.a: Apply the acquired scientific knowledge, concept and principles of Food Science and Chemistry, Nutrition Nutritional Biochemistry, Food Analysis, Human Physiology, Biochemical Techniques, Research methodology and Statistics, Community Nutrition, Clinical and Therapeutic Nutrition, Food Microbiology and Safety, Functional Foods and Nutraceuticals in their future endeavor.

PSO. 1.b. Harness and apply the professional and entrepreneurial skills in various Industries, Institutes for the Economic empowerment of self and the community.

PSO.2.a. Make use of the learnt communication skills and strategies to disseminate the gained Knowledge and skills in real life situation among the peer group, learned gatherings and the community.

PSO.2.b. Enhance and correlate the scientific innovations from lab to the community.

PSO.3. Discover the scientific reasons for the problems occurs in the community and able to solve them wisely by using learnt knowledge and skills in the Nutrition and Dietetics programme.

PSO.4. Analyse and evaluate the current practices in Food Science and Chemistry, Nutrition Nutritional Biochemistry, Food Analysis, Human Physiology, Biochemical Techniques, Research methodology and Statistics, Community Nutrition, Clinical and Therapeutic Nutrition, Food Microbiology and Safety, Functional Foods and Nutraceuticals to bring whole some development among the community through various extension activities.

PSO.4.b. Analyse critically the existing situation/issues of the community and provide solution to overcome the situation/issues for promoting the sound health among the people by using acquired knowledge and skills.

PSO.5.a. Make use of ICT for lifelong learning to improve the carrier opportunities and face the challenges in the day today life.

PSO.6. Form team work and bring cooperation among the peer group, professional and the community to meet the multi-cultural competency to bring harmonious situation.

PSO.7. Follow the moral and ethical values obtained from the programme to bring sustainable and peaceful environment.



## BIOCHEMICAL TECHNIQUES

### LEARNING OBJECTIVES (LOs)

The objectives of the course enable the student to

- ❖ To recognize various equipment and apparatus available in biochemistry laboratory.
- ❖ To describe the working of each of these instruments / apparatuses and practice the general and safety measures recommended for working in a laboratory.
- ❖ To provide an explanation of the components of qualitative and quantitative analysis of food samples.

### Unit I:

#### Introduction to Laboratory Equipment and Basic Laboratory Operations

Identification and use of common laboratory glassware and equipment. Techniques of simple laboratory operation, Laboratory reagents, Use and care of common laboratory instruments, Basic needs of a clinical laboratory.

### Unit II:

#### General Comments on Specimen Collection

General consideration, Blood, Urine, Sputum, Throat swab, stool, Cerebrospinal fluid, miscellaneous specimens. Specimen collection for hematological studies, cleaning of laboratory glassware in hematology

### Unit III:

#### Collection and processing of Blood for Transfusion, Urine and Semen Analysis

Preparation for blood collection, Transportation of blood after collection, storage of blood, preparation and use of blood components. Urine Analysis: Indication, Composition and methods of collection of urine, Routine Urine Examination- Physical, chemical, microscopic examination, evaluation of Renal function tests. Semen Analysis: Clinical significance, Specimen collection, Laboratory investigation, examination of semen.

#### Unit IV:

##### Chromatography and Radio chemical Methods

Chromatographic Separations: Liquid, GC and TLC. Super critical fluid extraction chromatography.

Radiochemical Methods: Use of radio isotopes.

#### Unit V:

##### Routine Biochemical Tests

Glucose, Protein, Albumin, Urea. Creatinine, Uric Acid, Bilirubin, Triglycerides, Cholesterol.

#### REFERENCE:

1. Wilson and Walker's Principles and Techniques of Biochemistry and Molecular Biology
2. John. F. Robyt, Bernard J. Whik. Biochemical Techniques, Published 1987.
3. Hclmut Gunzler Alex Williams, Hand book of Analytical Techniques. March 20001

#### COURSE OUTCOMES

On completion of the course, students will be able to

CO 1. Outline the basic knowledge of biochemical Techniques and the instruments.

CO 2. Find out the working principles of various biochemical instruments used in the laboratory.

CO 3. Analyse the applications of biochemical techniques and instruments.

CO 4. Recommend the various biochemical techniques to find out the abnormalities.

CO 5. Compile and predict the normal and abnormal biochemical aspects.

#### Mapping

Core – Biochemical Techniques											
CO	PO					PSO					
	1	2	3	4	5	1	2	3	4	5	6
1	3	3	3	3	2	3	3	3	3	3	3
2	3	3	3	3	2	3	3	2	3	3	2
3	3	3	3	3	1	3	3	2	3	3	2
4	3	3	3	3	2	3	3	1	3	3	1
5	3	3	3	3	1	3	3	2	3	3	2

Strongly Correlated (3); Moderately Correlated (2); Weakly Correlated (1); No Correlation (0)

## CLINICAL DIETETICS – I

### LEARNING OBJECTIVES (LOs)

- To understand the etiology, physiological and metabolic anomalies of acute and chronic disorders /diseases on nutritional status, nutritional and dietary requirements
- To be able to recommend and provide appropriate nutrition care for prevention and treatment of various disorders /diseases
- To remain updated on recent advances in Medical Nutrition Therapy (MNT) for various diseases
- To study the current knowledge of the diseases to a reasonable plan for nutritional care in its prevention and treatment.

### Unit I

#### Nutritional Management for Infections, Fevers, Covid- 19 and Burns

Nutritional management for infections and fevers – meaning, etiology, nutrition and infection – metabolic changes during infection. Febrile conditions- classification, etiology, symptoms, dietary management, treatment- fever, typhoid, tuberculosis, malaria. Covid- 19 etiology Signs, symptoms, causes dietary management and treatment. Nutritional management for burns – classification, complication, dietary management, mode of feeding, support, non-dietary treatment for burns

### Unit II

#### Nutritional Care in Weight Management and Gastrointestinal tract diseases and disorders

Obesity and underweight- Types, predisposing factors, diagnosis, Nutritional care in weight management, treatment and prevention. Gastro-intestinal tract disorders and diseases: types, etiology, clinical symptoms, Dietary Management, treatment – Dyspepsia, Diarrhoea, Dysentery, Constipation, Hiatal Hernia, Diverticular disease, Peptic ulcer, Gastritis, GERD, Inflammatory bowel syndrome, Short bowel syndrome, Ulcerative colitis.

### **Unit III**

#### **Diet for Liver, Gall bladder and Pancreatic diseases and Diabetes:**

Liver, Gall bladder and Pancreatic disorders: classification, etiology, Dietary Management, clinical symptoms, treatment -Hepatitis, cirrhosis, hepatic encephalopathy, Cholelithiasis, Cholecystitis Pancreatitis. Diabetes: classification, etiology, factors affecting blood glucose, metabolic aberrations, Hormonal controls & functions of the disorders, symptoms, complications, diagnosis, Nutritional therapy, insulin therapy, prevention.

### **Unit IV**

#### **Nutritional management of coronary heart and renal diseases**

Cardiovascular diseases: types, risk factors, causes, relation to lipid metabolism, hormonal mechanisms, symptoms, complications, dietary management, treatment and prevention – Hypertension, Atherosclerosis Myocardial Infarction, Congestive Heart failure, Coronary Bypass Surgery. Renal problems: classification, etiology, clinical and metabolic manifestations, clinical symptoms, commonly available commercial formulas for renal patients, dietary Management, treatment - renal calculi, Renal stone, Dialysis glomerulonephritis, Renal failure.

### **Unit V**

#### **Diet for Cancer and disabling disease:**

Nutrition & Cancer: Causes, epidemiological factors, treatment, therapeutic problems & Goals, Problems related to cancer treatment, nutritional therapy. Nutrition support in disabling disease: Pre-disposing factors, nutritional therapy-Gout

#### **REFERENCE:**

1. Sri lakshmi (2003) Dietetics, Wiley Eastern publishers.
2. Corrine Robinson (1990) Normal and Therapeutic Nutrition, Oxford and IBH publishers.
3. Swaminathan. M. (2000) Principles of Nutrition and Dietetics, Bappco publishers, Bangalore.
4. Gopalan et al., (2001) Nutritive value of Indian Foods, NIN publication, Hyderabad.
5. Bhavana sabarwal (1999) principles and practices of Dietetics, Ajay verma common wealth publishers, New Delhi.
6. Davidson Passmore (1989) Human Nutrition and Dietetics, London Churchill and Livingston publishers.

**COURSE OUTCOMES:**

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

CO 1 Understand the basic principles of diet and diet therapy.

CO 2 Acquire the knowledge of modifications of normal diet for therapeutic purposes.

CO 3 Apply the principles of diet for the management of metabolic diseases.

CO 4 Use the nutrition care process for special conditions like allergy.

CO 5 Develop the dietary models for cancer and Covid

**Mapping**

<b>Core –Clinical Dietetics I</b>											
<b>CO</b>	<b>PO</b>					<b>PSO</b>					
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
<b>1</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>
<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>1</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>
<b>4</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>1</b>	<b>3</b>	<b>3</b>	<b>1</b>
<b>5</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>1</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>

Strongly Correlated (3); Moderately Correlated (2); Weakly Correlated (1); No Correlation (0)

**ADVANCED FOOD SCIENCE AND CHEMISTRY**

**LEARNING OBJECTIVES (LOs)**

- To provide complete and simplified reach out to understanding of the basic Food Chemistry & Nutrition to the students of the Food Technology.
- To study on Carbohydrates, dietary fibre, starch, Proteins, Lipids, Pigments, Food flavours, Enzymes, Nutrition, balanced diet, essential amino acids and essential fatty acids, protein efficiency ratio, water soluble and fat-soluble vitamins, role of minerals in nutrition, co-factors, anti-nutrients, nutraceuticals, nutrient deficiency diseases.
- To examine the Chemical and biochemical changes: changes occur in foods

**Unit I**

**Introduction to Food Science and simple sugars**

Carbohydrates in the diet- classification, chemistry, Functionality and their Role in Food Industry and Functional Properties of Carbohydrates, Polysaccharides , Sugars and Sweeteners, Starch : Structure , gelatinization , methods for following gelatinization changes , characteristics of some food starches. Effects of ingredients and conditions on gelatinization . Modified food starches, Non-starch Polysaccharides: Cellulose, hemicelluloses, pectine, gums, animal polysaccharides. Sugars and Sweeteners: Sugars, syrups, potent sweeteners , sugar products, Sweeteners chemistry related to usage in food products: Structural relationships to sweetness perceptions, hydrolytic reactions, solubility and crystallization, hygroscopicity, colligative properties, Textural contribution, fermentation , non enzymatic browning.

**Unit II**

**Lipids**

Introduction, Classification and Composition Functional Properties of Food Lipids Deep Fat Frying, Deteriorative Changes in Fats and Oils. Antioxidants Preventing the Deteriorative changes in Fats and oils.

**Unit III**

**Protein**

Introduction and sources, Classification, composition and Biological Functions, Functional Properties of Protein, Protein Concentrates, Isolates and Hydrolysate and their applications

## **Unit IV**

### **Vitamins and Minerals**

Vitamin A, B, C, D, E, K- classification, importance, occurrence, determination, application, functions. Minerals -classification, nutritional and functional role, bioavailability, Estimation of minerals in foods, effect of processing on mineral content of foods.

## **Unit V**

### **Enzymes and Pigments**

Enzymes - Introduction, classification, role of enzymes and coenzymes in metabolism, isozymes, enzymes in clinical diagnosis. Biotechnological application – enzyme utilization in food industry, applications in food industry. Pigments- natural colours used in foods, novel sources of natural colourants, stability of natural colourants, stabilized forms of natural colourants.

## **REFERENCE:**

1. Belitz.W. grosch. 1986. Food Chemistry. Springer Verley Belin Heidelberg, New York. 2.David. S. Robinson, 1987. Food biochemistry and Nutritive Value.
2. Longman Group, U.K. 3.Leslie Hart.F and Harry Johnstone Fisher, 1971. Modern Food Analysis. Spinger – Verlag, New York.
3. .Dauthy, M.E. 1995. Fruit and Vegetable processes. FAO Agricultural Services Bulletin 119. Rome.
4. Sadasivam.S.A, Manickam, 1996. Biochemical methods for agricultural sciences. NewAge InternationalPublishers.
5. Potter H.N: Food Science, the AV Publishing Co., Inc., Wet poet, Connecticut 1968.
6. Destrosier N.W. The technology of food preservation. The AV Publishing Co., inc West post, Connecticut 1973.

## **COURSE OUTCOMES**

On completion of the course, students will be able to

CO 1. Discuss the concept , source ,and composition of macro and micronutrients.

CO 2: Identify the role and functions of the macro and micro nutrients, enzymes and pigments in human nutrition and food industries.

CO 3. Classify the macronutrients, micronutrients and enzymes.

CO.4 Asses the physic –chemical and functional properties of the micronutrients , micronutrients and pigments

CO 5 . Predict the effects of processing of foods on micronutrients , micronutrients and pigments

## Mapping

Core –Advanced Food Science and Chemistry											
CO	PO					PSO					
	1	2	3	4	5	1	2	3	4	5	6
1	3	3	3	3	2	3	3	3	3	3	3
2	3	3	3	3	2	3	3	2	3	3	2
3	3	3	3	3	1	3	3	2	3	3	2
4	3	3	3	3	2	3	3	1	3	3	1
5	3	3	3	3	1	3	3	2	3	3	2

Strongly Correlated (3); Moderately Correlated (2); Weakly Correlated (1); No Correlation (0)



## FOOD MICROBIOLOGY AND SAFETY

### LEARNING OBJECTIVES (LOs)

This course will enable the student to:

- Gain deeper knowledge of role of microorganisms in humans and environment.
- Understand the importance of microorganisms in food spoilage and to learn advanced, techniques used in food preservation.
- Understand the latest procedures adopted in various food operations to prevent food-borne, disorders and legal aspects involved in these areas.

### Unit I

#### Introduction to Food Microbiology

Food Microbiology – Basic Concept and History of Food Microbiology. Role of Microbiology in Biotechnology Role of Microorganisms in Fermented Foods. Indicators of food safety and quality : Microbiological criteria of foods and their significance.

### Unit II

#### Factors Affecting Food Safety

Physical Hazards, Biological, Hazards, Chemical Hazards, Microorganisms in Foods, Bacteria, Fungi, Yeasts, Moulds, Viruses, Parasites, Recent Concerns of Food Safety Prions, Concern of Genetically Modified Foods. Concern of Dioxin-Contaminated Foods. HACCP system and food safety used in controlling microbiological hazards.

### Unit III

#### Microbiology of Air, Water, Soil and Food

Microbiology of Air, Water and soil, Sources of food contamination, Factors Affecting the growth of Microorganisms – Nutrition, Oxygen, Temperature, Moisture Requirement – The concept of Water Activity, Osmotic Pressure, Hydrogen Ion Concentration- pH and light. Control and Destruction of Microorganisms.

### Unit IV

#### Factors Responsible for food Spoilage

Chemical Changes due to Spoilage-cereals and cereal products, Fruits and Vegetables, Soft Drinks, Fruits Juices, Fruit Preserves and Miscellaneous Products, Milk and Milk Products, Meat, Poultry and Poultry Products, Fish and Other Sea Foods.

## **Unit V**

### **Food Borne infections and Diseases**

Food Borne Diseases–types, Definition–intoxication infection, Food Borne Intoxications– Staphylococcal Poisoning, Bacillus Cereus Poisoning and Botulism. Food Borne Infections – Salmonellosis, Shigellosis (Bacillary dysentery), Vibrio Parahaemolyticus Gastroenteritis, Enteropathogenic E.coli Diarrhoea, Hepatitis A and Shellfish Poisoning. Food Borne Diseases Due to Naturally occurring Toxicants – Lathyrism, Veno- occlusive Disease (VOD), Epidemic Dropsy

### **REFERENCE:**

1. Atlas, M.Ronald (1995) Principles of Microbiology, 1<sup>st</sup> Edition, Mosby-Year Book, inco, Missouri, U.S.A.
2. Frazier, W.C. (1998) Food Microbiology, Mc Graw Hill Inc, 4<sup>th</sup> Edition.
3. Roday. S. (1999) Food Hygiene and Sanitation, 1<sup>st</sup> Edition, Tata Mc Graw Hill, New Delhi.
4. Joshua A.K. 2000 Microbiology. Popular Book Depot, Madras.
5. Adams & Moss 2000, Food Microbiology, Panima Publishing corporation, New Delhi.
6. Anandhanarayan. R & C.K.J. Panicker, 2003, Textbook of Microbiology, Orient longman publications, Chennai.

### **COURSE OUTCOMES**

On completion of the course, students will be able to

- CO 1 Trace the history of food microbiology, and the basic concept of Food Microbiology, Food Safety, Foods Food Spoilage and Food Hazards.
- CO 2 Identify the different types of microbes and sources of microbial spoilage and contamination of food.
- CO 3 Analyze the role of microbes in food spoilage, Biotechnology and fermented foods, Indicators of food safety and quality.
- CO 4 Deduct different microbes and recommend the various measures to prevent the spoilage.
- CO 5 Propose the latest procedures adopted in various food operations to prevent food-borne, disorders and legal aspects involved in these areas.

## Mapping

Core – Food Microbiology and Safety											
CO	PO					PSO					
	1	2	3	4	5	1	2	3	4	5	6
1	3	3	3	3	2	3	3	3	3	3	3
2	3	3	3	3	2	3	3	2	3	3	2
3	3	3	3	3	1	3	3	2	3	3	2
4	3	3	3	3	2	3	3	1	3	3	1
5	3	3	3	3	1	3	3	2	3	3	2

Strongly Correlated (3); Moderately Correlated (2); Weakly Correlated (1); No Correlation (0)

**MSU / 2021-22 / PG –Colleges / M.Sc.( Dietetics and Food Management ) / Semester -I / Ppr.no.5 /  
Practical - 1**

**BIOCHEMICAL TECHNIQUES**

1. Demonstration of Qualitative analysis of urine
2. Determination of iron and Hemoglobin in blood
3. Estimation of urea in blood
4. Estimation of glucose in blood
5. Estimation of cholesterol in blood.
6. Determination of moisture, Ash - total, acid soluble and insoluble
7. Determination of Protein in foods by Micro-Kjeldahl method.
8. Carbohydrates Starch – Digestible and Resistant Starches, Dietary fiber – Soluble and insoluble.

**COURSE OUTCOMES:**

On completion of the course, students will be able to

CO 1. Demonstrate isolate and estimate the amount of biomolecules in general.

CO2. Demonstrate separation of protein by electrophoresis..

CO 3. Analyze blood for glucose level

CO 4. Gain knowledge of biological samples and their collection procedures.

CO 5. Assess presence and absence of normal and abnormal constituents in urine by performing qualitative urine analysis

**Mapping**

<b>Biochemical Techniques Practical</b>											
<b>CO</b>	<b>PO</b>					<b>PSO</b>					
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
<b>1</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>
<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>
<b>4</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>
<b>5</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>

**Strongly Correlated (3); Moderately Correlated (2); Weakly Correlated (1); No Correlation (0)**

**MSU / 2021-22 / PG –Colleges / M.Sc.( Dietetics and Food Management ) / Semester -I / Ppr.no.6 /  
Practical - 2**

**CLINICAL DIETETICS - I**

**I. Visit to hospital to observe tube feeding**

**II. Meal Planning and preparation of diet for**

- a) Post-operative patient
- b) Typhoid, tuberculosis
- c) Covid-19
- d) Obesity, Underweight
- e) Ulcer
- f) Typhoid and Tuberculosis
- g) Cirrhosis, Hepatitis

**COURSE OUTCOMES:**

On completion of the course, students will be able to

CO 1. Acquire the skills and techniques involved in the planning and preparation of therapeutic diets for various ailments

CO2. Develop the capacity and attitude for taking dietetics as a profession.

CO 3. Evaluate the related food source for the special conditions.

CO 4. Acquire skills to plan a diet for metabolic diseases based on the dietary modification.

CO 5. Gain experience to plan and calculate the modified diet.

**Mapping**

<b>Clinical Dietetics I Practical</b>											
<b>CO</b>	<b>PO</b>					<b>PSO</b>					
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
<b>1</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>
<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>
<b>4</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>
<b>5</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>

**Strongly Correlated (3); Moderately Correlated (2); Weakly Correlated (1); No Correlation (0)**

## APPLIED HUMAN PHYSIOLOGY

### LEARNING OBJECTIVES (LOs)

This course will enable students to

- Advance their understanding of some of the relevant issues and topic of human physiology.
- Enable the students to understand the integrated functions of all systems and the grounding of nutritional science in physiology.
- Understand alterations of structure and functions in various organs and systems in diseases conditions.

### Unit I

Cell Structure and Function - Levels of cellular organisation and Function- Organelles, tissues, organs and systems- Cell membrane , transport across cell, membrane and intercellular communication , Regulation of cell multiplication. Nervous System - Structure and function of neuron, conduction of nerve impulse, synapses, role of neurotransmitters Organisation of central nervous system, structure and functions of brain, spinal cord , afferent and efferent nervous, blood brain barrier , CSF, Hypothalamus and its role in various body functions- obesity , sleep, memory.

### Unit II

**Endocrine system**-Endocrine glands - Structure , functions, role of hormones , regulations of hormonal secretion. The neuro endocrine axis, disorders of endocrine glands , emphasis of physiology on physiology of diabetes and stress hormone. **Sense Organs** - Structure and function Secretory, Digestive and Absorptive functions, role of liver , pancreas and gall

### Unit III

**Digestive System**- Structure and function- Role of lungs in the exchanges of gases, Transport of Oxygen and CO<sub>2</sub>, Role of hemoglobin and buffer systems , Cardio- respiratory response to exercise and physiological effects of training. **The Circulatory System** - Structure and function of heart and blood vessels, Regulation of cardiac output and blood pressure, heart failure ,hypertension. Blood formation, composition, blood clotting and haemostasis: Formation and function of plasmaprotein, Erythropoiesis, Blood groups and histocompatibility indices. Use of blood for investigation and gidgnosis of specific disorders, Anemia

### Unit IV

**The excretory system** - Structure and function of nephron, Urine formation, role of kidney in maintaining pH pf blood. Water , electrolyte and acid base balance, diuretics. The Musculo- Skeletal system - Structure and function of bone, cartilage and connective tissue , Disorders of the Skeletal system. Types of muscles, Structure and Function.

## Unit - V

**Immune System** - Cell mediated and humoral immunity , Activation of WBC and production of antibodies , Role in inflammation and defence. **Reproduction** - Menstrual cycle, Spermatogenesis, physiological changes in pregnancy.

## References

1. Ganong , w.f (1985) Review of Medical Physiology 12<sup>th</sup> Edition, Lange Medical Publication.
2. Moran Campell. E.J., Dickinson , C.J., Slater, J.D., Edwards C.R.W and Sikora, K. ( 1984) Clinical Physiology, 5<sup>th</sup> Edition , ELBS , Blasckwell Scientific Publications.
3. Guyton A.C ( 1985) Function of the Human Body , 4<sup>th</sup> Edition , W. B.Sanders Company , Philadelphia
4. Wilson, K.J.W.and Waugh, A (1996) Ross and Wilson Anatomy and physiology in Health and illness 8<sup>th</sup> Edition, churchill Livingstone.
5. Jain A.K Textbook of Physiology .Vol. I and II Avichal Publishing Co., New Delhi.

## COURSE OUTCOMES:

On completion of the course, students will be able to

CO 1. Illustrate the structure of the various cell, organs, glands and system in the human body.

CO2. Find out the role of various cell, organs, glands and system in the human body.

CO 3. Focus the composition and mechanism of various organs in the human body.

CO 4. Assess the mechanism, process and regulations of different organs and system in the human body.

CO 5. Predict the alterations of structure and functions in various organs and systems in diseases conditions.

## Mapping

Core – Applied Human Physiology											
CO	PO					PSO					
	1	2	3	4	5	1	2	3	4	5	6
1	3	3	3	3	2	3	3	3	3	3	3
2	3	3	3	3	2	3	3	2	3	3	2
3	3	3	3	3	1	3	3	2	3	3	2
4	3	3	3	3	2	3	3	1	3	3	1
5	3	3	3	3	1	3	3	2	3	3	2

Strongly Correlated (3); Moderately Correlated (2); Weakly Correlated (1); No Correlation (0)

## CLINICAL DIETETICS – II

### LEARNING OBJECTIVES (LOs)

- To study different tests for various diseases.
- To know the biochemical composition of blood and different parts of the body.

### Unit I

#### Changes in Carbohydrate metabolism

Level of blood glucose in normal and abnormal conditions – maintenance of blood glucose level, Inborn errors of carbohydrate metabolism, ketosis, pentosuria, galactosuria, glucosuria, Glycogen storage diseases, Glucose tolerance test, galactose, toleranc etest

### Unit II

**Changes in Lipids during disorders** - Types and level of lipids in blood lipid transport. Plasma lipoprotein metabolism, plasma lipoprotein and atherosclerosis. Primary disorders of lipoproteins hyper and hypocholesteremia Inborn errors of fat metabolism

### Unit III

**Changes in protein during disorders** - Plasma – functions and inborn errors of amino acid metabolism– phenylketonuria, albinism, alkaptonuria and maple syrup urine disease.

### Unit IV

**Tests for liver and gastric function** - Bile Salt – functions, formation of bile acids and bile salts, bile pigments from haemoglobin, Test for liver function tests based on excretory, metabolism, capacity for intoxication and enzymes, vitamin and mineral metabolism, Test for gastric function : collection and examination of stomach contents determination of free acidity, fractional test meal – normal and abnormal curves, examination of duodenal contents, Test for malabsorption examination of faeces- determination of fat content of faeces, fat balance study, Xylose absorption and excretion test and vitamin A absorption test.

### Unit V

**Tests for renal function-** Urine examination – their significance in health and disease: tests for kidney function – urea clearance, insulin clearance, creatinine clearance. concentration test, dye test.

### Reference

1. Cantrow A and Trumper, Clinical Bio-Chemistry, M.W.B. Saunders co – 1975



2. Swaminathan, M. Bio-Chemistry for medical teachers
3. Harold valley, Clinical Bio- Chemistry (1986)
4. Bhavana sabarwal (1999) principles and practices of Dietetics, Ajay verma common wealth publishers, NewDelhi.
5. Davidson Passmore (1989) Human Nutrition and Dietetics, London Churchill and Livingston publishers.

**COURSE OUTCOMES:**

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

- CO 1 Understand the basic principles of diet and diet therapy.
- CO 2 Acquire the knowledge of modifications of normal diet for therapeutic purposes.
- CO 3 Apply the principles of diet for the management of metabolic diseases.
- CO 4 Use the nutrition care process for special conditions like liver and gastric function.
- CO 5 Develop the dietary models for renal failure.

**Mapping**

Core – Clinical Dietetics II											
CO	PO					PSO					
	1	2	3	4	5	1	2	3	4	5	6
1	3	3	3	3	2	3	3	3	3	3	3
2	3	3	3	3	2	3	3	2	3	3	2
3	3	3	3	3	1	3	3	2	3	3	2
4	3	3	3	3	2	3	3	1	3	3	1
5	3	3	3	3	1	3	3	2	3	3	2

Strongly Correlated (3); Moderately Correlated (2); Weakly Correlated (1); No Correlation (0)

## FUNCTIONAL FOODS AND NUTRACEUTICALS

### LEARNING OBJECTIVES (LOs)

- To gain knowledge about functional foods and Nutraceuticals
- To have thorough understanding about the health effects
- To be familiar with applications in industry.

### Unit I

**Introduction-** Functional foods and nutraceuticals- Introduction, definition, importance, Health attributes of functional foods –Introduction, Health living Index provides information on healthy diet.

### Unit II

**FFN and probiotic** - Prebiotic and Probiotic immune system, sources of micro algal health supplements. Colonic Functional Foods : Introduction, Metabolism, Probiotics, Symbiotic, Health aspects of functional colonic foods, Host – microbe interaction, treatment of GI tract disorders

### Unit III

**Phytochemicals - Introduction** –Terpenoids, Polyphenolics, Anthocyanins, Isoflavones, Silymarin, Tangeretin, Saponins, Other dominant phytochemicals.

### Unit IV

**Other Nutraceuticals** - Source, natural constituents of animal and vegetable lipids, functions of PUFAs. Functional foods in the control of aging, mood and performance

### Unit V

**Nutraceuticals in medical foods** - Anti – Tumor properties: Nature of tumour growth, mode of carcinogenesis, Diet and gene interactions, Mechanisms of action, Nutrients & their role of functional foods

#### Reference:

- 1.Mary K. Schimsl and Theodore P. Labuza; Essentials of functional foods 2000, Culinary and Hospitality industry Publication Services
- 2.C. Remacle and B. Reusens, Functional Foods, Aging and Degenerative Diseases, Culinary & Hospitality Publications Services.

**COURSE OUTCOMES:**

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

CO 1. Describe about source, chemistry and uses of several natural nutraceuticals.

CO 2. Describe occurrence, chemical nature and medicinal benefits of natural nutraceuticals belong to different phytochemical categories.

CO 3. Explain about different free radical which generate in body and their effects and different dietary fibres and complex carbohydrate as functional food ingredients

CO 4. Explain the role of free radicals in development of different diseases and aging

CO 5. Explain the role of natural and synthetic antioxidants, functional foods in prevention of chronic diseases.

**Mapping**

<b>Core – Functional Foods and Nutraceuticals</b>											
<b>CO</b>	<b>PO</b>					<b>PSO</b>					
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
<b>1</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>
<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>1</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>
<b>4</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>1</b>	<b>3</b>	<b>3</b>	<b>1</b>
<b>5</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>1</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>

Strongly Correlated (3); Moderately Correlated (2); Weakly Correlated (1); No Correlation (0)

## FOOD PRODUCT DEVELOPMENT AND MARKETING

### LEARNING OBJECTIVES (LOs)

This course will enable students to

- Understand and know various aspects of food product development including food Science and Technology, marketing and Consumer research, finance and communication.
- Develop products which meet consumer needs, and nutritionally and commercially viable.
- Recognize the potential for entrepreneurship through marketing.

### Unit I

New Food Products - Definition, Classification, Characterization Factors shaping new product development - Social concerns, health concerns impact of technology and market place influence. Reasons for new food product development ( corporate, market place, technological and governmental influences ) Assessing needs from various perspective.

### Unit II

Generation of New Product ideas- Internal sources of ideas, External sources of ideas, Market place analysis Screening, Team Approach and involvement of various departments, Objectives of screening, Criterion of screening.

### Unit III

Development Process - Market Sector perspective and market research, Technical development -Recipe development and scale up, food safety and food spoilage. Newer food stabilizing systems: Thermal processing , stabilizing with high pressure, other non- thermal stabilizing systems, control of water , controlled modified atmosphere packaging, irradiation, low temperature stabilization. Use of various new ingredients to suit product functions, Packaging , Design Graphics and Labeling

### Unit- IV

Refining the screening Procedure for the product, Sensory Evaluation, Shelf life Testing, Product Integrity and Conformance to standards

### Unit V

Test Marketing: Evaluating results and analyzing, Entrepreneurship : Plant location , investment , Financing the project, New products in Food Service industry.

## References:

1. Fuller,G.W (1994) New Food Product Development : From Concept to Market place CRC Press, New York.
2. Man .C.M.D and Jomes A.A (1994) Shelf life Evaluation of Foods, Blackie Academic and Professional, London.
3. Shapton, D.A and Shapton . N.F. ( 1991) Principles and Practices for the Sate Processing of Foods. Butter worth Heinemann Ltd, Oxford.
4. Oickle,J.G. ( 1990) New Product Development and Value Added . Food Development Division Agriculture, Canada.

## Journals

1. International Journal of Food Science and Technology
2. Food Technology
3. Critical Reviews in Food Science and Nutrition

## COURSE OUTCOMES:

- On the successful completion of the course, students will be able to
- CO 1. Reflect on the role of food trends in the new product development process.
- CO 2. Design a food product through the application of knowledge of food ingredients and functional foods.
- CO 3. Design and apply packaging for food products.
- CO 4. Evaluate product quality and sensory properties.
- CO 5. Combine theoretical knowledge and practical skills to reproduce existing food products.

## Mapping

Core – Food Product and Development											
CO	PO					PSO					
	1	2	3	4	5	1	2	3	4	5	6
1	3	3	3	3	2	3	3	3	3	3	3
2	3	3	3	3	2	3	3	2	3	3	2
3	3	3	3	3	1	3	3	2	3	3	2
4	3	3	3	3	2	3	3	1	3	3	1
5	3	3	3	3	1	3	3	2	3	3	2

Strongly Correlated (3); Moderately Correlated (2); Weakly Correlated (1); No Correlation (0)

**MSU / 2021-22 / PG –Colleges / M.Sc.( Dietetics and Food Management ) / Semester -II / Ppr.no.11 /  
Core -9**

**Field work - (Internship Training in hospital -one month)**

**Field Work - Report**

- Students are likely to attend their fieldwork locations and complete assignments as listed on Assignments Due Date according to the schedule directed by the department.

**APPLIED HUMAN PHYSIOLOGY**

- (i) Analyzing CO<sub>2</sub> content of exhaled air with the Müller’s method.
- (ii) Measurement of human electrocardiogram (ECG) using the Biopac system.
- (iii) Analysis of human blood pressure.
- (iv) Analysis of human blood sugar level.
- (v) Determination of bleeding and clotting time.
- (vi) Determination of Skin Thickness.

**COURSE OUTCOMES:**

On completion of the course, students will be able to

CO 1. Understand the biochemical basis for nutrition and health.

CO2. Understand the mechanisms adopted by the human body for regulation of metabolic pathways.

CO 3. Get an insight into interrelationships between various metabolic pathways.

CO 4. Become proficient for specialization in nutrition.

CO 5. Understand integration on the cellular level metabolic events to nutritional disorders and imbalances.

**Mapping**

Applied Human Physiology Practical											
CO	PO					PSO					
	1	2	3	4	5	1	2	3	4	5	6
1	3	3	3	3	2	3	3	3	3	3	3
2	3	3	3	1	2	3	3	2	3	3	2
3	3	3	3	3	2	3	3	2	3	3	2
4	3	3	3	3	2	3	3	2	3	3	2
5	3	3	2	3	3	3	3	2	3	3	2

Strongly Correlated (3); Moderately Correlated (2); Weakly Correlated (1); No Correlation (0)

**MSU / 2021-22 / PG –Colleges / M.Sc.( Dietetics and Food Management ) / Semester -II / Ppr.no.13 /  
Practical - 4**

**CLINICAL DIETETICS - II**

- ❖ Preparation of diet counselling aids for common disorders
- ❖ Visit to hospital to observe tube feeding
- ❖ Planning and Preparation of diets for patients with common multiple disorders an complications and discharge diet plants
- ❖ Preparation of diet counselling aids for common disorders.

**Meal Planning and preparation of diet for**

- ❖ Diabetes
- ❖ Hypertension, Atherosclerosis,
- ❖ Renal failure, Renal stone
- ❖ Gall bladder stone
- ❖ Glomerularnephritis
- ❖ Cancer and Gout

**COURSE OUTCOMES:**

On completion of the course, students will be able to

CO 1. Understand the etiology, physiology and metabolic anomalies of acute and chronic diseases and patient needs.

CO 2. Know the effect of the various diseases on nutritional and dietary requirements.

CO 3. Be able to recommend and provide appropriate nutritional care for prevention and treatment of various diseases.

CO 4. Nutritional Education and Diet Counseling

CO 5. Planning and preparation of diets with modifications.

**Mapping**

<b>Clinical Dietetics II Practical</b>											
<b>CO</b>	<b>PO</b>					<b>PSO</b>					
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
<b>1</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>
<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>
<b>4</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>
<b>5</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>

Strongly Correlated (3); Moderately Correlated (2); Weakly Correlated (1); No Correlation (0)



## NUTRITIONAL BIOCHEMISTRY

### LEARNING OBJECTIVES (LOs)

- To augment the biochemistry knowledge acquired at the undergraduate level
- Understand the mechanisms adopted by the human body for regulation of metabolic pathways
- Get an insight into interrelationships between various metabolic pathways  
Become proficient for specialization innutrition
- Understand integration of cellular level metabolic events to nutritional disorders and imbalances.

### Unit I

**Carbohydrates** - Structure and its properties-Monosaccharide- glucose, fructose, Galactose, Disaccharides- Maltose, Lactose, sucrose. Polysaccharides- Starch and glycogen. Carbohydrate metabolism- Glycolysis, Gluconeogenesis, Glycogenesis, TCA cycle.

### Unit II

**Protein** - Structure and properties. Deamination, transamination, decarboxylation, ureacycle. Nutritional classification protein, determination of nutritive value of proteins- PER, Digestibility coefficient, BV, NPR, NPU, Chemical score, nitrogen balance, supplementation of protein. Fluid, electrolyte and acid base balance.

### Unit III

**Lipids** -Lipid- properties of lipid. Iodine, saponification and peroxide value. Lipid metabolism-  $\beta$  oxidation of fatty acids.

### Unit IV

**Vitamins & Minerals - Vitamins:** Structure, biochemical properties, functions and sources.

**Minerals:** Structure, biochemical properties, functions and sources.

### Unit V

#### Enzymes & Co-enzymes

Enzymes- Definition, classification of enzymes and factors influencing enzymeaction.Co-enzyme- Definition and its types. Structure and function of DNA- transcription and replication. Structure and function of RNA- types- mRNA, rRNA and tRNA.

### Reference

1. Arumugam, (1994). Elements of Biochemistry. Saraspublication.
2. Ambika Shanmugam, (1998). Fundamentals of Biochemistry. Karthik OffsetPrinters.
3. Reghuramulu , N., Madhavan Nair and K.Kalyanasundaram,S. (1983) A Manual of Laboratory Techniques NIN, ICMR.

4. Plummer D.T ( 1987)B3rd An Introduction to Practical Biochemistry , Mc Graw- Hill Book Co.
5. A manual of laboratory techniques Cantrow A and Trumper, Clinical Bio-Chemistry, M.W.B. Saunders co – 1975.
6. Swaminathan, M. Bio-Chemistry for medical teachers, Harold valley, Clinical Bio-Chemistry (1986).

## COURSE OUTCOMES

On completion of the course, students will be able to

- CO1 Classify the biomolecules and Illustrate the structure of primary metabolites .
- CO2 Identify the properties of biomolecules.
- CO 3 Analyse the mechanisms adopted by the human body for the regulation of metabolic pathways.
- CO 4 Asses the biosynthesis and metabolic pathway of macronutrient and the role of biomolecules in the metabolism.
- CO5 Predict interrelationships between various structure and functions to become proficient for specialization in nutrition.

### Mapping

Core – Nutritional Biochemistry											
CO	PO					PSO					
	1	2	3	4	5	1	2	3	4	5	6
1	3	3	3	3	2	3	3	3	3	3	3
2	3	3	3	3	2	3	3	2	3	3	2
3	3	3	3	3	1	3	3	2	3	3	2
4	3	3	3	3	2	3	3	1	3	3	1
5	3	3	3	3	1	3	3	2	3	3	2

Strongly Correlated (3); Moderately Correlated (2); Weakly Correlated (1); No Correlation (0)

## FOOD PROCESSING AND PRESERVATION

### LEARNING OBJECTIVES (LOs)

This course is designed to:

- Impart systematic knowledge of basic and applied aspects of food processing and technology.
- Provide the necessary knowledge of basic principles and procedures in the production of important food products
- Orient the students to potential use of various by- products of food industry

### Unit I

Introduction: Importance of storage, Physical principles in food Processing operations, Thermal processing- Degree of processing or preservation ,selecting heat treatments, heat resistance of micro organisms, nature of heat transfer, protective effects of food constituents, types of thermal treatments. Refrigeration - Refrigeration , cool storage and shelf life extension , cool storage with air circulation, humidity control and gas modification( I.e. CA, MA,&SA)Freezing - Changes during freezing- rate of freezing, choice for final temperature for frozen foods, freezing methods, freezing effects. Dehydration - Dehydration, water activity and food safety / quality methods of dehydration

### Unit - II

**Chemical principles in food processing** - Preservation / Processing by Sugar, Salt, curing, Smoke, acid and chemicals, chemical changes in foods that affect texture , flavour, colour , nutritive values and safety during handling, storage and processing, chemical and biochemical reactions affecting food quality and safety, Processing technology of foods and nutritional implications for the following Cereals and pulses, Wheat grain characteristics and products: Wheat milling process , milling of durum or semolina. Corn wet milling: Corn starch products, Barley malting : dry milling and air classification : wet fractionation of barley pearling Storage and quality of cereal grains Rice processing, fractionation , quick - cooking rice, parboiled rice , rice based instant foods, Pulses - Processing, elimination of toxic factors, quick - cooking dals fermentation and germination.

### Unit III

Oil seeds - Oilseed pressing , solvent extraction, purification ( degumming, refining, bleaching, deodorization) hydrogenation, plasticising and tempering , products- butter, margarine, shortening, mayonnaise and salad dressing, inter- esterification and production of MCT. Fruits and Vegetables - Structure , composition, physiological and biochemical changes during ripening handling and storage. Varietal, harvesting and pre- processing considerations for vegetables, post harvest, processing practices. Processing of vegetables, canning, freezing, dehydration, pickles and chutneys. Fruit Processing - Citrus juices, apple juices, slices and dehydrated products, grape juice and raisins, Canning , fruit- based beverages and concentrates, squashes, jams, jellies, ketchup's, sauces, high sugar, high acid products.

## Unit - IV

**Milk and Milk Products** - Milk processing- Classification, separation and standardization, pasteurisation, off flavour removal, homogenisation, packaging. UH sterile milk. Milk products - Fortified milk, Skim milk, concentrate milks, cream. Butter, cheese, cultured milk products, dehydrated milk products, ice creams. Indigenous milk products, Khoa. Channa, paneer, curd, yoghurt, ghee, kulfi. **Meat, Fish and Eggs** : Chemistry of processed meats, Ageing and tenderising, curing, smoking and freezing of meat, fresh storage of meat. Fish preservation and processing. Meat and fish products : Preservation by curing, smoking, salting and pickling and dehydration, of meat. Dehydrated egg powder and frozen egg, egg storage

## Unit - V

### Additives and Preservatives

Definition of food additives, acids, bases, buffer systems and salts, chelating agents, antimicrobial agents, sweeteners, stabilizers and thickeners, fat replacers, firming, texturizers, appearance control and clarifying agents. Flavour enhancers, aroma substances, sugar substitutes, sweeteners, antioxidants Anticaking agents, bleaching agents, protective gases. Processing and extraction of essential oils and colours, stability, storage and preservation.

## Reference

- 1) Rao, Chandra Gopala (2006). Essentials of food process engineering. B.S.Publications.
- 2) Khatkar, Bhupendra Singh ed (2007). Food science and technology. Daya PublishingHouse.
- 3) Singh, N.P (2007). Fruit and vegetable preservation. Oxford BookCompany.
- 4) Ahluwalia, Vikas (2007). Food processing. Paragon InternationalPublishers.
- 5) Sivasankar,B (2005). Food processing and preservation. Prentice - Hall ofIndia
- 6) Paul, Meenakshi (2007). Effects of food processing on bioactive compounds. Gene-Tech Books.
- 7) Rahman, Shafiur : (2007). 2nd Edn Handbook of food preservation. CRCpress.
- 8) Arthey, David . (2005). 2nd ed Fruit processing.Springer,
- 9) Fellows.P (2005). 2nd edn Food processing technology. woodhead publishingcompany.
- 10) Lewis Michael (2000). Continuous Thermal Processing Of Foods.Aspen.
- 11) Koutchma, Tatiana (2007). Ultraviolet light in food technology, CRCPress.

**COURSE OUTCOMES:**

On completion of the course, students will be able to

CO 1. Explain the mechanisms of spoilage and deterioration of foods and raw materials: microbial, chemical, physical, biochemical, etc.

CO2 Analyze, interpret and explain complex phenomena of vegetables and fruits in context of preservation principles

CO 3. Compile a literature review on a new topic related to preservation principles and analyze results of specific literature work in that area (Bloom III-IV) Exams, assignments

CO 4. Compare and contrast processing methods for milk and milk products Communicate clearly and effectively Assignments

CO 5. Explain the effects of processing steps on nutritional quality, including bioactive components, of foods

**Mapping**

<b>Core – Food Processing and Preservation</b>											
<b>CO</b>	<b>PO</b>					<b>PSO</b>					
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
<b>1</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>
<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>1</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>
<b>4</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>1</b>	<b>3</b>	<b>3</b>	<b>1</b>
<b>5</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>1</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>

Strongly Correlated (3); Moderately Correlated (2); Weakly Correlated (1); No Correlation (0)

## COMMUNITY NUTRITION

### LEARNING OBJECTIVES (LOs)

- To describe the expanding role of the community dietitian and Health Economics status.
- To understand and articulate nutrition problems and practices in the community.
- To discuss and understand the various nutrition monitoring and surveillance methodologies and how they are used

### Unit-I

**Health Economics & Economics of Malnutrition** – Introduction, Health Economics, Malnutrition and its Economic Consequences, Economics in Nutrition Economic Evaluation of Malnutrition

### Unit-II

**Nutritional Problems-I** – Introduction, Protein Energy Malnutrition(PEM), Micronutrient Deficiencies.

**Nutritional Problems-II**– Introduction, Vitamin Deficiencies, Fluorosis, Lathyrism

### Unit-III

**Assessment of Nutritional Status In Community Settings-I** – Introduction, Nutritional Assessment - Goals and Objectives, Methods of Nutritional Assessment, Indirect Assessment of Nutritional Status, Direct Assessment of Nutritional Status, Nutritional Anthropometry, Methods of Assessing Nutritional Status in Individuals, Methods of Assessment of Nutritional Status of Community. **Assessment of Nutritional Status In Community Settings-II** – Introduction, Clinical Assessment, Biochemical Assessment, Dietary Assessment

### Unit-IV

**Nutrition Monitoring & Nutrition Surveillance** – Introduction Monitoring, Nutrition Monitoring, Nutrition Surveillance System(NSS) , Nutrition Policy & Programmes – Introduction, National Nutrition Policy(NNP)Nutrition Programmes - Anemia, Iodine and Malnutrition Integrated Child Development Services (ICDS) Programme, Nutrient Deficiency Control Programmes, Supplementary Feeding Programmes, Food Security Programmes, Self Employment and Wage Employment Schemes

### Unit-V

**Strategies To Combat Public Nutrition Problems** Introduction, Immunization, Supplementary Feeding Programmes, Improving the Quality of Food Produced by Genetic Approaches, Clean Water, Sanitation and Street Foods and Strategies to Improve the Street Foods, Improving Food and Nutrition Security, Fortification of Food. Conceptualization &The Process of Nutrition Education – Introduction, Understanding the Need and Scope of Nutrition Education, Importance of Nutrition Education, Potential Challenges and the Constraints of Nutrition Education, Theories of Nutrition Education, Process of Nutrition Education Communication.

### Reference:

1. Mahan, L.K. and Escott-Stump, S. (2008): Krause's Food Nutrition and Diet-Therapy, 12th Edition, W-13 Saunders Ltd.,Canada.

2. Garrow J.S, James W. P.T, Ralph A, (2000), Human Nutrition and Dietetics, 10th edition, Churchill Livingston, London.
3. Antia F.P. And Philip Abraham (2001) Clinical Nutrition and Dietetics, Oxford Publishing Company, New Delhi.
4. Williams, S.R. (2003): Nutrition and Diet Therapy, 7th Edition, Times Mirror/Mosby Collage Publishing
5. Esthwr. Winterfeldt, Margret. Bogle, LeaL. Ebro.(2011).Dietetics: Practice &Future Trends. Third Edition. Jones and Barlet Publishers. UK.

## COURSE OUTCOMES

On completion of the course, students will be able to

- CO 1 Discuss the concept of Health Economics, deficiency diseases Nutritional Assessment, Nutrition Monitoring & Nutrition Surveillance, Nutrition Policy & Programmes and Nutrition Education.
- CO 2 Find out the scope, need, importance and role of Health Economics, Nutritional Assessment, Nutrition Monitoring & Nutrition Surveillance, Nutrition Policy & Programmes and Nutrition Education to promote the health status of the community.
- CO 3 Identify the causes for deficiency diseases and focus the methods of assessing nutritional status, nutrition education, intervention Programmes.
- CO 4 Assess the consequences of deficiency diseases and nutritional intervention programmes to promote the overall development of the community.
- CO 5 Predict the nutritional problems and develop the nutrition programmes and strategies to overcome the existing nutritional problems.

## Mapping

Core – Community Nutrition											
CO	PO					PSO					
	1	2	3	4	5	1	2	3	4	5	6
1	3	3	3	3	2	3	3	3	3	3	3
2	3	3	3	3	2	3	3	2	3	3	2
3	3	3	3	3	1	3	3	2	3	3	2
4	3	3	3	3	2	3	3	1	3	3	1
5	3	3	3	3	1	3	3	2	3	3	2

Strongly Correlated (3); Moderately Correlated (2); Weakly Correlated (1); No Correlation (0)

## RESEARCH METHODOLOGY

### LEARNING OBJECTIVES (LOs)

- To understand the methodology of research and techniques.
- To develop skills in conducting research from planning a study to report writing.
- To apply statistical procedure to analyse numerical data draw inferences.

### Unit I

**Methods of Research-** Merits and demerits of scientific research, Different types of research and characteristics, Historical research, Ex-post facto research, laboratory experiments, Field experiments, survey research, evaluative research, Case study research, operational research, participatory research, Steps in conducting research, Hypothesis: Definition, purpose, types

### Unit II

**Sampling Design** - Census and sample survey- Steps in sampling design, Sample size and its determination, Types of sampling: Random Sampling, Simple random sampling, Stratified random sampling, Systematic sampling, Cluster sampling, Non random sampling methods: Judgement sampling, Convenience sampling, quota sampling, Benefits of sampling, Sampling errors, Non sampling errors,

### Unit III

#### **Methods of Data Collection and Classification -**

Methodsofcollectingprimarydata:Questionnaire,Interview,Schedule,Observation,Inventories,Checklists, Scaling techniques, Drafting of questionnaire, training of interviewers, Criteria for evaluation of instruments – reliability and validity, Sources of secondary data, precautions in the use of secondary data, Classification of data: types of classification, Formation of discrete and continuous probability distributions. Tabulation of data: parts of a table, general rules of tabulation, types of tables, Diagrammatic representation of data, Graphic representation of data,

### Unit IV

**Statistical Methods** - Measures of central tendency: mean, median and mode, their relative advantages and disadvantages, Measures of dispersion: Mean deviation, standard deviation, Coefficient of variation, percentile, Types of correlation, coefficient of correlation and its interpretation-Rank correlation, Regression equations and predictions, Analysis of variance, Contingency tables ,Chi-square test, „ttest: student's „ttest,paired „ttest, unpaired „ttest,, Ftest



## **Unit V**

Sampling Statistics and Introduction to Statistical Package for Social Sciences (SPSS), Introduction to Statistical Package for Social Sciences (SPSS), Interpretation and Report writing, Meaning of Interpretation, why Interpretation, Technique of Interpretation, precaution in Interpretation. Significance of report writing, Different steps in writing Report, Layout of the Research Report, Types of Report, Oral Presentation, Mechanics of writing a Research Report, Precautions for writing Research Reports ,Conclusions.

### **References:**

1. Van Maanen ( 1983) Quantitative Methodology , Sage Publication
2. Patton M.Q (1980) Qualitative Evaluation Methods .Sage Publication
3. Walker , R.( 1983) Applied Qualitive Research , Gower, London
4. Cameron, M.E and Van Staveren , W.A (1988) Manual on Methodology for Food Consumption Studies Oxford University Press Oxford.
5. Research Methodology- Methods and Techniques ( 2004) Fatma Zohra Sahraoui

### **COURSE OUTCOMES**

On completion of the course, students will be able to

- CO 1. Describe the concept of Research,Sampling Design, Data,report writing ,Statistical Methods, and SPSS.
- CO 2. Identify the different types of research, data, sampling and statistical methods.
- CO 3. Plan the research design; discover the appropriate sampling methods, data collection, hypothesis, statistical analysis for getting solution to the problems.
- CO 4 Assess the means of interpreting the data and conclude the results based on the acquired scientific research knowledge and skill to solve the research problem.
- CO 5. Prepare the research report by using appropriate research methods and statistical tool s/w to get solution to the existing problem based on research ethics.

## Mapping

Core – Research Methodology in Food Science and Nutrition											
CO	PO					PSO					
	1	2	3	4	5	1	2	3	4	5	6
1	3	3	3	3	2	3	3	3	3	3	3
2	3	3	3	3	2	3	3	2	3	3	2
3	3	3	3	3	1	3	3	2	3	3	2
4	3	3	3	3	2	3	3	1	3	3	1
5	3	3	3	3	1	3	3	2	3	3	2

Strongly Correlated (3); Moderately Correlated (2); Weakly Correlated (1); No Correlation (0)

## COMMUNITY NUTRITION -- PRACTICAL

1. Assessment of Nutritional Status
  - a) Anthropometric Measurement
  - b) Clinical Assessment
  - c) Bio Chemical Estimation
  - d) Diet Survey
2. Nutrition Education and the roll of Dietitian
3. Preparation of Flash Cards, Pamphlets, Leaflets, Charts, Posters
4. Video and Short Film

### COURSE OUTCOMES:

On completion of the course, students will be able to

CO 1. Gain knowledge on the national effort in combating malnutrition

CO 2. Appreciate the national and International contributor towards national improvement in alleviating nutrition problems.

CO 3. Learn about the terms related to health and fitness

CO 4. Comprehend the interaction between fitness and nutrition

CO 5. Employability scope for Government services and sanitary inspectors.

### Mapping

Community Nutrition Practical											
CO	PO					PSO					
	1	2	3	4	5	1	2	3	4	5	6
<b>1</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>
<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>
<b>4</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>
<b>5</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>

Strongly Correlated (3); Moderately Correlated (2); Weakly Correlated (1); No Correlation (0)

**PRACTICAL: FOOD PROCESSING AND PRESERVATION**

1. Refrigeration and Freezing of fruits and vegetables.
2. Refrigeration and Freezing of meat and fish.
3. Sun and Oven drying of Fruits and Vegetables.
4. Preparation of Jam, Jelly, Syrup and Squash.
5. Preparation of pickles.
6. Visit to Canning and Bottling unit.
7. Visit to fish processing unit.
8. Visit to a food packaging unit.

**COURSE OUTCOMES:**

On completion of the course, students will be able to

CO 1. To develop the skill to analyze the quality like sugar such as jam, jelly etc.

CO 2. To explain the fermentation process such as canning and bottling unit .

CO 3. To analyze technologies in food preservation..

CO 4. To discuss preservation of foods by salt and acid.

CO 5. To evaluate the novel technologies in food preservation.

**Mapping**

Food Processing and Preservation Practical											
CO	PO					PSO					
	1	2	3	4	5	1	2	3	4	5	6
1	3	3	3	3	2	3	3	3	3	3	3
2	3	3	3	1	2	3	3	2	3	3	2
3	3	3	3	3	2	3	3	2	3	3	2
4	3	3	3	3	2	3	3	2	3	3	2
5	3	3	2	3	3	3	3	2	3	3	2

Strongly Correlated (3); Moderately Correlated (2); Weakly Correlated (1); No Correlation (0)

## **HUMAN FACTORS AND ERGONOMICS**

### **LEARNING OBJECTIVES (LOs)**

- To become aware of the role of ergonomics in work effectiveness and efficiency
- To understand the environmental factors contributing to productivity , safety, control and well - being of individual performing the work.

### **UNIT- I**

**Introduction to Ergonomics** - Definition, History and evolution. Scope of Ergonomics in home and other occupations, Nature of work in household and other occupations, Human Body and Work: Physiology of Neuro-muscular function in relation to occupational ergonomics; Physiological factors in muscle work; Physical work capacity; Energy requirement for muscular work; Energy expenditure for different activities; Endurance and muscular strength.

### **UNIT- II**

**Job Analysis** - Significance of job analysis for occupational ergonomics, Fundamental elements of job analysis. Anthropometry in relation to occupational ergonomics. Postures-Definition and Scope.

### **UNIT- III**

**Application of Ergonomic Principles in:** Tool Evaluation and Design; Work Station Evaluation and Design; Maintenance of Postures. Identifying types of postures assumed during work, analysis and interpretation, Effect of wrong postures on cardio- vascular and muscular skeletal system, Correct techniques of lifting and carrying weights

### **UNIT- IV**

Physiological Aspects of Work, Structure and Function of the muscles, Biochemistry of muscle work. Physiological factors involved in muscular work. Carbohydrates, fats and protein, Oxygen, Cardio-Vascular and Respiratory system, Thermo- regulatory system, Endurance and muscular strength, Skill, Maximal work, Speed, Factors affecting physiological reactions doing work, Workload and posture

### **UNIT- V**

**Cardio-Respiratory Fitness** - Anthropometric measurements and Physical Fitness Index, Body composition - body fat % , Body surface area, lean body mass by skin fold method and Somatotyping. Maximum aerobic capacity using modified Harvard test ( Queens college test), Determination of workload using heart rate and oxygen consumption- Treadmill, step stool, Heart rate and oxygen consumption, Pulserate, Time and motion study. Energy cost. Assessment of Physical work capacity (PWC)

## References

1. ( Astrand P .O. and Radahl K. : Textbook of Work Physiology , McGraw Hill, New
2. Davies D.R. and Shakleton V .J. : Physiology of work, Motunen & Co. Ltd.
3. Osborne David : Ergonomics at work, John Wiley and sons, New York.
4. Dul Jan and Weed mester Bernard : Ergonomics for Beginners, Tylorand Francis, London.
5. Wilson J.R. and Corlett N. : Evaluation of Human Work. A Practical Ergonomics Methodology. Tylor and Francis, London.
6. Pheasan Stephan : Body space, Anthropometry , Ergonomics and the Designs at work, Taylor& Francis, London.

## COURSE OUTCOMES:

On completion of the course, students will be able to

CO 1. Explain the psychology of human behavior as it relates to workplace safety.

CO2. Identify ergonomic hazards; recommend appropriate controls.

CO 3. Relate the human and workplace factors which contribute to ergonomic hazards.

CO 4. Explain and apply human factors engineering concepts in both evaluation of existing systems and design of new systems.

CO 5. Acknowledge the impact of workplace design and environment on productivity.

## Mapping

Core – Human Factors and Ergonomics											
CO	PO					PSO					
	1	2	3	4	5	1	2	3	4	5	6
1	3	3	3	3	2	3	3	3	3	3	3
2	3	3	3	3	2	3	3	2	3	3	2
3	3	3	3	3	1	3	3	2	3	3	2
4	3	3	3	3	2	3	3	1	3	3	1
5	3	3	3	3	1	3	3	2	3	3	2

Strongly Correlated (3); Moderately Correlated (2); Weakly Correlated (1); No Correlation (0)

## **FOOD QUALITY CONTROL**

### **LEARNING OBJECTIVES (LOs)**

- Provide adequate theoretical background and understanding about sensory evaluation of food.
- Enable students to use various sensory methods for evaluation variety of foods.
- Enable students to analyse and interpret sensory evaluation data.

### **Unit I**

General principles of quality control – quality attributes - size, shape, colour, consistency, viscosity, texture, taste and flavour. Methods of evaluation of food quality – sensory, objective technique, micro biological methods of quality evaluation. General testing conditions – quantitative difference tests – designing of questionnaire (or) evaluation of scorecard.

### **Unit II**

Food contaminants: Naturally occurring toxicants, anti-nutritional factors in foods. Environmental containments: Biological contaminants, Pesticide residues, veterinary drug residues and heavy metals.

### **Unit III**

Direct Additive: Preservatives, Nitrate, Nitrite, and N-nitroso compounds. Indirect Additives, Anti-microbial and veterinary drugs, pesticides, poly halogenated aromatic hydrocarbons, polycyclic aromatic hydrocarbons. Other organic residues, packing materials, heavy metals, Radio nuclides in foods.

### **Unit IV**

Common adulterants – tests to detect adulterants, Government and trade standards for quality – food laws and regulations – PFA, FPO and APEDA- BIS standards – Agmark standard – International Standards for export. HACCP – Food safety system.

### **Unit V**

Laws and regulations for setting up a processing unit. FSSAI rules and regulations, FSSAI Licence , Registration, FSSAI in Food safety and Standards

### **Reference**

1. Giridarilal Sidappa, G.S., and Tandon, G.L. (1979) Preservation of fruits and vegetables, ICAR, NewDelhi.
2. FPO (1955), QualityControl.
3. Horace, D.Graham, 1980, the safety of foods, 2<sup>nd</sup> End, AVI publishing Co.Inc, Westport.
4. Julie Miller Jones, 1992, Food Safety, Eagan Press, USA.

5. Lewis M.J. 1987, Physical properties of food and processing system, Ellis Harwood Ltd., England.
6. Picgott, J.R, 1984, Sensory Analysis of Foods, Elsevier Applied Science Publisher, New York.

**COURSE OUTCOMES:**

On completion of the course, students will be able to

- CO 1. Explain safety and quality management systems that ensure integrity through the food chain.
- CO2. Discuss the practical applications of Laboratory Information Management Systems in the food industry.
- CO 3. Understand the quality management standards, philosophies and frameworks.
- CO 4. Students will know about risk management strategies employed in the food industry.
- CO 5. Understand about the key regulatory issues that ensure food safety and quality.

**Mapping**

<b>Core – Food Quality Control</b>											
<b>CO</b>	<b>PO</b>					<b>PSO</b>					
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
<b>1</b>	3	3	3	3	2	3	3	3	3	3	3
<b>2</b>	3	3	3	3	2	3	3	2	3	3	2
<b>3</b>	3	3	3	3	1	3	3	2	3	3	2
<b>4</b>	3	3	3	3	2	3	3	1	3	3	1
<b>5</b>	3	3	3	3	1	3	3	2	3	3	2

Strongly Correlated (3); Moderately Correlated (2); Weakly Correlated (1); No Correlation (0)



## NUTRITION FOR FITNESS

### LEARNING OBJECTIVES (LOs)

This course will prepare the students to:

- Understand the components of health and fitness and the role of nutrition.
- Make nutritional , dietary and physical activity recommendations to achieve fitness and well – being.
- Develop ability to evaluate fitness and well - being

### Unit I

Definition, components and assessment criteria of age: Specific fitness and health status.

Holistic approach to the management of fitness and health:

Energy input and output Diet and Exercise. Effect of specific nutritions on work performance and physical fitness, nutrition, exercise, physical fitness and health inter-relationship.

### Unit II

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. Nutrition in Sports:

Sports specific requirement. Diet manipulation, Pre- game and post game meals. Assessment of different nutrigenic aids and commercial supplements. Diets for persons with high energy requirements, stress, fracture and injury.

### Unit III

Significance of physical fitness and nutrition in the prevention and management of weight control ,fat reduction and obesity. Exercise and Weight control - fundamentals of aerobics, Nutrition guidance on balanced eating and nutritional advice to clients for obesity, skin nourishment, hair treatment.

### Unit IV

Yoga- Meaning, Aims, Objectives, significance, Systems of Yoga - Eight limbs of yoga.

### Unit V

Asanas - Classification, difference between physical exercise and yogic exercise, Guidelines for practicing Asanas. Meditation - Meaning, types, benefits.

### References

1. B.K.S. Iyengar, Light on yoga, London University, in paperback, 1989.
2. Yogeshwar, Text Book of Yoga, Madras Yoga Centre.
3. K. Chandrasekaran, “Sound health through Yoga” PremKalyan Publication, Sedapatti, 1999.
4. Ira Wolinsky 1998 .Nutrition in Exercise and sports , 3<sup>rd</sup> edition, CRC Press.
5. Sizer, F.& Whitney , E( 2000) Nutrition - Concepts & Controversies, 8<sup>th</sup> Edition , Wadsworth Thomson Learning.

**COURSE OUTCOMES:**

On completion of the course, students will be able to

CO 1. Identify the major muscle groups of the body that are used with cycling.

CO2. Students will acquire knowledge and demonstrate skills to safely engage in physical activity.

CO 3. Students will understand the principles of lifetime fitness and will incorporate fitness activities into a healthy and active lifestyle.

CO 4. Students will use basic principles of health and wellness to develop an informed, personal approach to mental and physical health. Students will acquire knowledge and demonstrate skills to safely engage in physical activity.

CO 5. Students will demonstrate and value knowledge of psychological and sociological concepts, principles, and strategies that apply to physical activity and sport.

**Mapping**

<b>Core – Nutrition for fitness</b>											
<b>CO</b>	<b>PO</b>					<b>PSO</b>					
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
<b>1</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>
<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>1</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>
<b>4</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>1</b>	<b>3</b>	<b>3</b>	<b>1</b>
<b>5</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>1</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>

Strongly Correlated (3); Moderately Correlated (2); Weakly Correlated (1); No Correlation (0)

## **FOOD QUALITY CONTROL -- PRACTICAL**

1. Qualitative tests for detection of adulterants
2. Test for assessment of purity of water
3. Test for assessment of quality of milk and milk products
4. Test for assessment of quality of cereals/millet
5. Test for assessment of quality of pulses
6. Test for assessment of quality of fats and oils
7. Test for assessment of quality of meat/fish products
8. Test for assessment of quality of canned/bottle fruits and vegetables

### **COURSE OUTCOMES:**

On completion of the course, students will be able to

CO 1. Explain safety and quality management systems that ensure integrity through the food chain.

CO2. Discuss the practical applications of Laboratory Information Management Systems in the food industry.

CO 3. Understand the quality management standards, philosophies and frameworks.

CO 4. Students will know about test for assessment.

CO 5. Understand about the key regulatory issues that ensure food safety and quality.

## Mapping

Food Quality Control Practical											
CO	PO					PSO					
	1	2	3	4	5	1	2	3	4	5	6
1	3	3	3	3	2	3	3	3	3	3	3
2	3	3	3	1	2	3	3	2	3	3	2
3	3	3	3	3	2	3	3	2	3	3	2
4	3	3	3	3	2	3	3	2	3	3	2
5	3	3	2	3	3	3	3	2	3	3	2

Strongly Correlated (3); Moderately Correlated (2); Weakly Correlated (1); No Correlation (0)

## INTERNSHIP TRAINING IN HOSPITALS (ONE MONTH):

- The Dietetic Internship is to provide a high quality education and a variety of supervised practice experiences to prepare interns to be effective entry-level dietitian nutritionists.
- A summary of the Internship shall be submitted to the department and viva voce shall be conducted for student individually.

### COURSE OUTCOME

CO: 1 Analyze the internship training in the hospital

CO: 2 Experience in the hospitals has the opportunity to observe in action

CO: 3 Internships can speed up the process of moving towards the career goals.

CO: 4 Students will develop professional aptitude, strengthen personal character, and provide a greater door to opportunity

CO:5 Understand about the internships are way to show commitment to professionalism, self improvement, and excellence

### Mapping

Internship Training											
CO	PO					PSO					
	1	2	3	4	5	1	2	3	4	5	6
1	3	3	3	3	2	3	3	3	3	3	3
2	3	3	3	1	2	3	3	2	3	3	2
3	3	3	3	3	2	3	3	2	3	3	2
4	3	3	3	3	2	3	3	2	3	3	2
5	3	3	2	3	3	3	3	2	3	3	2

Strongly Correlated (3); Moderately Correlated (2); Weakly Correlated (1); No Correlation (0)

**FIELD WORK STUDY TOUR- REPORT:**

- Students are likely to attend their fieldwork locations and complete assignments as listed on Assignments Due Date according to the schedule directed by the department.
- A study tour is a credit-bearing course in which the majority of the academic work is accomplished through group study and travel outside the campus. A summary of the study tour will be submitted to the department.

**COURSE OUTCOME**

CO: 1 The students will observed and analyzed theories used to identify solutions for a specific project or case report.

CO: 2 Understand that field reports facilitate the development of data collection techniques

CO: 3 Understand that observation skills and allow you to understand how theory applies to real world situations.

CO: 4 Students used methods of observing professional practice that challenge or refine existing theories.

CO:5 Students to make their own observations, order their experiences, make decisions and set their own priorities as to what to focus on that

**Mapping**

Field Work											
CO	PO					PSO					
	1	2	3	4	5	1	2	3	4	5	6
1	3	3	3	3	2	3	3	3	3	3	3
2	3	3	3	1	2	3	3	2	3	3	2
3	3	3	3	3	2	3	3	2	3	3	2
4	3	3	3	3	2	3	3	2	3	3	2
5	3	3	2	3	3	3	3	2	3	3	2

Strongly Correlated (3); Moderately Correlated (2); Weakly Correlated (1); No Correlation (0)

## PROJECT & VIVA-VOCE:

- Students are encouraged to work on Individual Project to get acquaintance to real life problem solving and hands -on experience. The outcomes of the projects would be submitted as report and viva voce shall be conducted for student individually.

## COURSE OUTCOME

CO: 1 The project gives students the opportunity to experience real research

CO:2 Students will have a greater problem solving skills.

CO:3 Students will gain better understanding of research methods.

CO: 4 Deeper understanding of the discipline of the research

CO: 5 Better understanding of career and education path.

### Mapping

Project Viva Voce											
CO	PO					PSO					
	1	2	3	4	5	1	2	3	4	5	6
1	2	3	3	3	2	3	3	3	3	3	3
2	3	3	3	2	2	3	3	2	3	3	2
3	3	2	3	3	2	3	3	2	3	3	2
4	3	3	3	1	2	3	3	2	3	3	2
5	3	3	2	3	3	3	3	2	3	3	2

Strongly Correlated (3); Moderately Correlated (2); Weakly Correlated (1); No Correlation (0)