

*Placed at the meeting of  
Academic Council  
held on 26.03.2018*

**APPENDIX - AX**  
**MADURAI KAMARAJ UNIVERSITY**  
*(University with Potential for Excellence)*

**M.Sc. Home Science (Nutrition, Dietetics and Hospitality Management)**

**CHOICE BASED CREDIT SYSTEM - REVISED SYLLABUS**

**(With effect from 2018-2019)**

**REGULATIONS**

**1. Introduction of the programme:**

The PG programmes in Home Science – (Nutrition, Dietetics and Hospitality Management) and Food Processing and Quality Control aims at imparting expertise in Food Science, Human Nutrition, Dietetics, Food service management, Food Processing and Quality Control and Hospitality Management.

**2. Eligibility for Admission:**

UG: Plus Two pass

PG: UG with 55% marks

B.Sc in

- Home Science
- Nutrition and Dietetics
- Food Service Management and Dietetics
- Bio chemistry
- Microbiology
- Biotechnology
- Chemistry
- Zoology

**2.1. Duration of the Programme : 2 Years**

**2.2. Medium of Instructions : English**

**3. Objectives of the Program**

The PG programme aims at imparting advanced knowledge and skills in their respective areas of specialization. On completion of the PG programme, the students will

- Have advanced knowledge in Food Science, Food Microbiology, Dietetics, Hospitality administration, Food Processing and Quality Control, Food Product Development and Marketing,
- Have hands-on experience in Clinical Laboratory Techniques, Diet Planning and Preparation for normal and therapeutic conditions, Food industry Administration and Quantity Production.
- Get field experience in hospitals and hotels.
- To develop entrepreneurs and entrepreneurship skill in Food Processing sectors.
- To provide scope for Research and Development.

### **M.Sc – Nutrition, Dietetics and Hospitality Management:**

The course is designed with the following objectives:

- To gain indepth knowledge and professionally competent dietetic skills for hospitals, food service institutions and industry.
- To develop skills in planning, monitoring and evaluation of nutrition and health programs.
- To familiarize with food safety skills.
- To inculcate entrepreneurial skills.

The course aims at

- Incorporating soft skills
- Instilling skills related to Computer and Information Technology.
- Developing competency in food handling and diet planning.
- Inculcating holistic skills in Resource Management, Human Developing and Textiles and Clothing.

#### **4. Outcome of the Program**

On completion of any one of these PG programmes, the students will be eligible for the following jobs

- Quality assurance officers in Food industries
- Testing Analysts in Nutraceutical industries
- Product Development Officers in Food industries
- Food Industry Administrators
- Marketing Executives
- Dietitians
- Nutritionists
- Diet Counselors in Fitness Centres
- Hospitality Administrators
- Front Office Managers in hotels and hospitals

#### **5, 6 and 7. Core subject Papers, Subject Elective Papers & Non Major Elective Papers**

		<b>M.Sc. NUTRITION, DIETETICS &amp; HOSPITALITY MANAGEMENT</b>								
SEMESTER	PAPER	TITLE OF THE PAPER	HRS OF INSTRUCTION		TOTAL HRS	CREDITS	MAX MARKS		TOTAL MARKS	
			THEORY	PRAC			INT	EXT		
I	CORE 1	ADVANCED FOOD SCIENCE	6	3	9	6+2	25+40	75+60	100+100	
	CORE 2	ADVANCED HUMAN NUTRITION	6		6	5	25	75	100	
	CORE 3	ADVANCED FOOD SERVICE MANAGEMENT	5		5	5	25	75	100	
	CORE 4	ADVANCED MICROBIOLOGY	6		6	5	25	75	100	
	ELECTIVE 1	BIOCHEMICAL CHANGES IN DISEASES	4		4	4	25	75	100	
			<b>27</b>	<b>3</b>	<b>30</b>	<b>27</b>				

II	CORE 5	ADVANCED DIETETICS	8	3	11	6+2	25+40	75+60	100+100
	CORE 6	HOSPITALITY ADMINISTRATION	7		7	5			100
	CORE 7	RESEARCH METHODOLOGY	6		6	5			100
	ELECTIVE 2	FOOD PROCESSING	6		6	4			100
			<b>27</b>	<b>3</b>	<b>30</b>	<b>22</b>			
III	CORE 8	FUNCTIONAL FOODS & NUTRACEUTICALS IN PREVENTIVE DIETETICS	7		7	6			100
	CORE 9	DIETETIC INTERNSHIP	-	6	6	5			100
	CORE 10	CLINICAL INVESTIGATION	6	2	8	6	25+40	75+60	100+100
	ELECTIVE	BIOSTATISTICS & COMPUTER APPLICATIONS	6		6	4			100
	NME	NUTRITION IN HEALTH & FITNESS	2		2	2			100
			<b>21</b>	<b>9</b>	<b>30</b>	<b>24</b>			
	CORE 11	FOOD SAFETY & QUALITY CONTROL	6		6	5			100
IV	CORE 12	FOOD PRODUCT DEVELOPMENT & MARKETTING	6		6	5			100
		DISSERTATION	18			7			100
	<b>TOTAL</b>		<b>30</b>	<b>-</b>	<b>30</b>	<b>17</b>			
	<b>GRAND TOTAL</b>		<b>105</b>	<b>15</b>	<b>120</b>	<b>90</b>			

## 8. UNITISATION – 5 UNITS

## 9. PATTERN OF SEMESTER SYSTEM

### 10. Scheme for internal Assessment

The pattern of internal assessment will be as follows :

The pattern for internal valuation may be

- |                                      |                                 |
|--------------------------------------|---------------------------------|
| 1. Test -                            | -10 marks, average of two tests |
| 2. Group Discussion / Seminar / Quiz | - 5 marks                       |
| 3. Assignments :                     | -5 marks                        |
| 4. Peer –Team –Teaching/Learning     | - 5 marks                       |
| <b>Total</b>                         | <b>- 25 marks</b>               |

#### Theory

Internal : 25 marks

External :75 marks

#### Practicals

Internal :40 marks

External :60 marks

## 11. EXTERNAL EXAM

External Exam

## 12. QUESTION PAPER PATTERN

Title of the paper

Sub code

Time : 3 Hours

Max Marks : 75

### Section - A

(10 x1=10)

Question No. I to 10 (Multiple choice)

1. Two questions from each unit.
2. Four Choices in each questions.
3. No 'none of these' choice

### Section - B

(5 x7=35)

Answer all questions choosing either t a) or (b) Answers not exceeding two pages.

- (One question from each unit)
- 11 (a) or 11 (b)  
12 (a) or 12 (b)  
13 (a) or 13 (b)  
14 (a) or 14 (b)  
15 (a) or 15 (b)

### Section - C

(3 x10=30)

Answer not exceeding four pages

Answer any three out of five (one question from each Unit) Questions 16 – 20

## 13. Scheme of evaluation

To be given by the External Examiner

## 14. Passing Minimum

PG – 50%

### 14.1. Classification

S.No.	Range of CGPA	Class
1.	40 & above but below 50	III
2.	50 & above but below 60	II
3.	60 & above	I

## 15. Model Question Paper.

## 16. Teaching Methodology

- Blackboard – Chalk & Talk
- Powerpoint presentations
- Animations & videos
- Students' seminars.

- Self study portions regularly monitored by way of group discussions & presentations.
- LCD
- OHP
- Demonstrations
- Role play

### 17. Text Books

Given for each paper in the References

### 18. Reference Books

Given at the end of the syllabus for each paper.

### 19. Retotalling & Revaluation Provision

As per the norms of the University.

### 20. Transitory provision

UG syllabus revision once in 3 years and afterwards 3 years under transitory provision.

### 21. Related websites:

Provided for each paper.

## M.Sc. (NUTRITION, DIETETICS AND HOSPITALITY MANAGEMENT)

### CHOICE BASED CREDIT SYSTEM

SEMESTER	SUBJECTS					HOURS
	T	O	T	A	L	
I	MS (6)	MS (6)	MS (6)	MS (6)	ME (6)	30
II	MS (6)	MS (6)	MS (6)	MS (6)	ME (6)	30
III .	MS (6)	MS (6)	MS (6)	MS (6)	NME (6)	30
IV	PROJECT					30

**SCHEME OF VALUATION  
AND QUESTION PAPER PATTERN  
DISTRIBUTION OF MARKS BETWEEN EXTERNAL AND INTERNAL  
ASSESSMENT**

<b>THEORY</b>	<b>:</b>	<b>75:25</b>			
<b>PRACTICAL</b>	<b>:</b>	<b>60 : 40</b>			
<b>THESIS</b>	<b>:</b>	<b>REPORT PRESENT</b>	<b>-</b>	<b>80</b>	
		<b>VIVA VOICE</b>	<b>-</b>	<b>20</b>	
				<u><b>100</b></u>	

<b>M.Sc. NUTRITION, DIETETICS &amp; HOSPITALITY MANAGEMENT</b>									
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	ELECTIVE 1	BIOCHEMICAL CHANGES IN DISEASES	4		4	4	25	75	100
			<b>27</b>	<b>3</b>	<b>30</b>	<b>27</b>			
II	CORE 5	ADVANCED DIETETICS	8	3	11	6+2	25+40	75+60	100+100
	CORE 6	HOSPITALITY ADMINISTRATION	7		7	5			100
	CORE 7	RESEARCH METHODOLOGY	6		6	5			100
	ELECTIVE 2	FOOD PROCESSING	6		6	4			100
			<b>27</b>	<b>3</b>	<b>30</b>	<b>22</b>			
III	CORE 8	FUNCTIONAL FOODS & NUTRACEUTICALS IN PREVENTIVE DIETETICS	7		7	6			100
	CORE 9	DIETETIC INTERNSHIP	-	6	6	5			100
	CORE 10	CLINICAL INVESTIGATION	6	2	8	6			100
	ELECTIVE	BIOSTATISTICS & COMPUTER APPLICATIONS	6		6	4			100
	NME	NUTRITION IN HEALTH & FITNESS	2		2	2			100
			<b>21</b>	<b>9</b>	<b>30</b>	<b>24</b>			

	CORE 11	FOOD SAFETY & QUALITY CONTROL	6		6	5			100
IV	CORE 12	FOOD PRODUCT DEVELOPMENT & MARKETING	6		6	5			100
		DISSERTATION	18			7			100
	<b>TOTAL</b>		<b>30</b>	<b>-</b>	<b>30</b>	<b>17</b>			
	<b>GRAND TOTAL</b>		<b>105</b>	<b>15</b>	<b>120</b>	<b>90</b>			

**SEMESTER I  
CORE PAPER - I  
ADVANCED FOOD SCIENCE**

**Hours/week: 6**

**Credits: 6  
Marks: 100**

**OBJECTIVES**

This course is designed to:

- Provide an understanding of composition of various foodstuffs.
- Familiarise students with changes occurring in various foodstuffs as a result of processing and cooking.
- Enable students to use the theoretical knowledge in various applications and food preparations.

**UNIT 1: Constituents of Food: Properties and significance**

**Water and Food Dispersions:** Physical properties of water, chemical nature, Free and bound water, solutions and colligative properties. Water activity and Food spoilage.

**Food Colloids and Emulsions:** Colloidal salts, stabilization of colloidal systems.

- Gels: Structure, formation, strength, types.
- Emulsions: Formation, stability, surfactants and emulsifier
- Foams: Structure, formation and stabilization.

**UNIT 2: Polysaccharides, Sugars and Sweeteners**

- Starch: Gelatinization, Effects of ingredients and conditions on gelatinization. Modified food starches. Non-starch Polysaccharides: Cellulose, hemicelluloses, pectins, gums, animal / plant polysaccharides.
- Sugars: Kinds of sugar, sugar syrups, sugar products. Properties –solubility, hydrolytic reactions, crystallization, hygroscopicity, colligative properties, textural contributions, fermentation, non-enzymatic browning.
- Sweeteners: Types, properties, applications.

### **UNIT 3 : Proteins in foods:**

- Composition, coagulation, denaturation, non-enzymatic browning, putrefaction, and other chemical changes.
- Protein Concentrates, Hydrolysates and textured vegetable proteins.
- Milk substitutes-Soya, Groundnut, Coconut milk.

**Enzymes** - Nature of enzymes, stability and action. Proteolytic enzymes, oxidases, lipases, enzymes decomposing carbohydrates and applications. Enzymes in food fermentations. Immobilized enzymes.

### **UNIT 4 : Fats and Oils**

- Sources, Composition, Oil extraction, refining, hydrogenation, winterizing.
- Fats and Oils: Composition, Functional properties of fat and uses in food preparations. Animal fats and Plant oils -
- Changes in fat on cooking and processing. Trans fats. Quality of fat.
- Fat deterioration: types of rancidity and antioxidants. Fat substitutes.

### **UNIT 5: Food Colours and Flavours:**

- Pigments classification, structure and properties; Effects of processing on stability of pigments in foods and the factors influencing stability of colours in foods; Role of colours in food products. Safety limits.
- Flavors: Taste and nonspecific saporous sensations, Flavour compounds in vegetables, fruits and spices; Flavours produced from fermentation and volatiles on foods; Effect of processing on food flavours; Role of flavours in food products. Flavour encapsulation.

### **References**

1. Srilakshmi, B. 2005. Food Science, New Age International (P) Ltd., Publishers, New Delhi.
2. Potter, N. and Hotch Kiss, J.H. (1996): Food Science, Fifth edition, CBS Publishers and Distributors, New Delhi
3. Julians, B.O. (1985). Rice Chemistry and Technology, 2<sup>nd</sup> edition, American Association Chemists, St. Paul Mimesota, USA.
4. Charley, H. (1982). Food Science, 2<sup>nd</sup> edition, John Wiley & Sons, New York.
5. Arthey, D. and Ashurst, P.R. (1996). Fruit Processing, Blackie Academic & Professional, London
6. Desrosier, N.W. and James N. (2007). Technology of food preservation. AVI Publishers.
7. Meyer, L.H. 1974. Food Chemistry, AVI Publishing Co. Inc,
8. Manay, S. and Shadaksharamasamy, Food: Facts and Principles, New Age International (P) Publishers, New Delhi.

### **JOURNALS**

- ❖ Journal of Food Science.
- ❖ Advances in Food Research.
- ❖ Journal of Food Science and Technology.
- ❖ Journal of Agricultural and Food Chemistry.



**SEMESTER: I**  
**ADVANCED FOOD SCIENCE PRACTICAL**

**Hours/week: 3 Credits: 2**

**Max marks: 100**

1. Effect of solutes on boiling point and freezing point of water.  
Sugar and Jaggery Cookery: Identification of Relative sweetness, solubility and sizes of sugars, stages of sugar cookery, caramelization, crystallization, and factors affecting crystal formation.
2. Identification and preparation of different food dispersions: sols, gels, emulsions, aerosols.
3. Starches, Vegetable Gums and Cereals: Dextrinization, gelatinization, retrogradation, thickening power. Factors affecting gluten formation. Pectin content of fruits, role of acid, pectin and sugar in jam and jelly formation.
4. Assessment of egg quality. Use of egg in cookery - Emulsion, air incorporation thickening, binding, gelling. Method of egg cookery and effect of heat. Egg white foams and factors affecting foams.
5. Fruits and Vegetables: Pigments; effects of cooking, metal ions, pH. Effect of various cooking process on different characters of vegetables. Prevention of enzymatic browning.

**REFERENCES**

- 📖 Srilakshmi (2010) Food Science New Age Publications, New Delhi.
- 📖 Charley. H (1982): Food Science (2<sup>nd</sup> Edition), John Wiley & Sons, New York.
- 📖 Potter, N. and Hotchkiss, J.H. (1996); Food Science, Fifth Edition, CBS Publishers and Distributors, New Delhi.
- 📖 Belitz, H.D. and Grosch, W. (1999); Food Chemistry (2<sup>nd</sup> Edition), Springer, New York.
- 📖 Bowers, J. (1992); Food Theory and Applications, (2<sup>nd</sup> Edition), MacMillan.
- 📖 Peckham, G and Freeland — Graves, G.H. (1979); Foundations of Food Preparation.
- 📖 Usha Chandrasekaran (2002). Food Science and its Application to Indian Cookery, New Delhi : Phoenix Publishing.

**SEMESTER—I**  
**CORE PAPER - II**

**ADVANCED HUMAN NUTRITION**

**Hours/week : 6**

**Credits:5**

**Max marks:100**

**Learning outcomes**

This course will enable the students to:

- Gain in-depth knowledge of the physiological and metabolic role of macronutrients, fat soluble vitamins and electrolytes and their importance in human nutrition

- Enable the understanding of basis of human nutritional requirements and Recommendations through the life cycle and translate the knowledge into practical guidelines for dietary needs
- Familiarize with the recent advances in nutrition and apply this knowledge in planning for public health programmes

## **Unit I**

### **Human Nutritional Requirements – Development and Recent Concepts**

Methods of determining human nutrient needs; Description of basic terms and concepts in relation to human nutritional requirements; Guidelines and Recommendations- Translation of nutritional requirements into Dietary Guidelines

#### **Energy**

Components of energy requirements: BMR, RMR, thermic effect of food, physical activity. Factors affecting energy requirements, methods of measuring energy expenditure, Estimating energy requirements of individuals and groups, Regulation of energy metabolism and body weight, Control of food intake.

## **Unit II**

### **Carbohydrates**

Review of nutritional significance of carbohydrates and changing trends in dietary intake of different types of carbohydrates and their implications, Dietary fibre: Types, sources, role and mechanism of action, Resistant starch, fructo-oligosaccharides, other oligosaccharides: Chemical composition and physiological significance, Glycemic Index and glycemic load.

### **Proteins**

Role of protein in muscle, liver and G.I. tract in protein metabolism, Amino acid and peptide transporters, Requirements and dietary guidelines ,Therapeutic applications of specific amino acids, Peptides of physiological and nutritional significance.

### **Lipids**

Nutritional significance of fatty acids – SFA, MUFA, PUFA: functions and deficiency, Role of n-3 and n-6 fatty acids, Prostaglandins, Trans Fatty Acids, Nutritional Requirements and dietary guidelines for visible and invisible fats in diets.

## **Unit III**

### **Minerals**

Structure and chemistry, Food sources, Metabolism (digestion, absorption, transport, storage and elimination), Bioavailability and factors affecting bioavailability, Biochemical and physiological functions, Interaction with other nutrients, Pharmacological and therapeutic effects

Macro minerals: calcium, phosphorous, sodium, potassium

Micro mineral: iron, zinc, selenium, iodine and fluorine

## **Vitamins**

Structure, Metabolism (digestion, absorption, transport, storage and elimination), factors affecting bioavailability, Biochemical and physiological functions, Pharmacological and therapeutic effects

Fat soluble vitamins: A, D, E, K

Water soluble vitamins: B1, B2, B5, B6, B12, Vitamin C.

## **Unit IV**

**Sports Nutrition:** Need and scope of sports nutrition; Preparation for competition such as pregame meal, meal during game and post game meal; Concept of carbohydrate loading and the methods of carbohydrate loading; Nutrition management during sports/game; Ergogenic aids in sports.

**High Altitude and Space Nutrition:** Physiological changes due to high altitude; Acclimatization process; Altitude sickness and related health problems; Nutrient requirements and dietary management of mountaineers. Space Nutrition: Need and scope for space travel; History of space travel; Physiological changes in astronauts; Nutrient requirement and dietary management during space travel.

## **UNIT V**

**Sea ravel Nutrition:** Physiological changes in human body during sea travel; Psychological preparedness for sea travel; Health and nutritional problems encountered during sea travel; Nutrient requirements and dietary management during sea travel.

**Nutrition in Emergencies:** Need and importance; Types of emergency situations such as natural and manmade; Nutritional and health problems in emergencies; Control of communicable diseases through sanitation and immunization; Food distribution strategies; Nutrient requirement and dietary management during emergencies.

## **TEXT BOOKS**

1. Michael J. Gibney, Hester V Vorster and Frans J Kok (2003) Introduction to Human Nutrition . Blackwell publishing Oxford, U.K.
2. Kathleen mahan and Sylvia Escort- Stump (2000): Food , Nutrition and Diet Therapy 11<sup>th</sup> Edition, W.B. Saunder's Company London.

## **REFERENCES BOOKS**

1. Susan G. Dudek (2007) Nutrition Essentials for nursing Practice, Lippincot Williams D Wilkias, Philadelpha.
2. Z.S.C.Okoye: Biochemical Aspects of Nutrition, Prentice- Hall of India Private Ltd, New Delhi

## **JOURNALS**

1. American Journal of Clinical Nutrition
2. Indian Journal of Nutrition and Dietetics

## **WEBSITE:**

1. <http://www.discoveryeducation.com/>
2. <http://www.ncbi.nlm.nih.gov/>
3. <http://www.fao.org/>
4. <https://www.studenthealth.gov.hk>

## **SEMESTER—I CORE PAPER - III**

### **ADVANCED FOOD SERVICE MANAGEMENT**

**Hours/week:5**

**Credits:5**

**Max marks:100**

#### **Objectives: To**

1. develop skills in handling and maintenance of equipment
2. understand the key areas of institutional food service administration

#### **Specific Objectives of Learning :**

On successful completion of this course the student will be able :

- To administer a food service system in an effective manner
- To manage the human resources within a food service organization or department
- To develop appropriate skills required for a food service industry
- To develop and provide best nutritional menu and food to the client

#### **UNIT- I**

**Food Service Industry-** Commercial and Non Commercial Institutions. Commercial-Hotel, Motel, Restaurant, Bar, Pub and Fast Food Restaurant. Non Commercial-Transport Catering, Industrial Catering, hospital catering. Miscellaneous- Contract and Outdoor.

#### **UNIT - II**

**Management Tools-**The Organization Chart, Job Description and specification, Work schedule, Job Analysis, staff analysis, Budget, leadership style , decision making and communication.

**Material Management-** Food materials, cleaning, table ware, equipment, staff, time, and energy. Concepts of quality assurance-TQM,MBO

### UNIT - III

**Equipments used in Food Service Industries**-Classification of equipments electrical and non electricalequipments for food storage, Preparation, serving, dishwashing and laundering. Base materials used for finishes

### UNIT - IV

**Food plant**-Types of Kitchen, Layout of different food service establishments, drainage,water lines, lighting and ventilation adopted in different units such as kitchen, storage and dining area, working heights in relation to equipment.

### UNIT- V

**Personnel Management:** manpower planning, recruitment procedures, selection and induction, labour benefits and laws. **Financial Management:** Buying and accounting procedures in food service institution: budget, Inventory control, Cost accounting/analysis-Cost concepts- types of cost-fixed cost, semi fixed cost, variable cost. Costing of foods-selling price

Food cost control - methods of controlling food cost, break even analysis. Records to be maintained- System of book keeping, book of account- cash book, purchase book, sales book, purchase returns book, sales returns book, journal and ledger.Role of computers in management of FSI.

### References

1. Sethi, M.,Malhan,S.(2007) Catering Management: An integrated approach, New Age International
2. Sudhir Andrews,( 1999) Food and Beverage Service Training Manual, Tata McGraw Hill Publishing Company Ltd New Delhi
3. Lilli Crap, D R and Cousins J A (1999) Food and Beverage Service,4<sup>th</sup> Edition, Hodder and Stoughton
4. Aggarwal D.K (2006) Housekeeping Management, AMAN Publications, New Delh
5. Singh.R.K (2006) Modern Trends in Hospitality industry, AMAN Publications,New Delhi
6. John Wiley (2005),Book Of Yeild :Accuracy in Food Costing and Purchasing,6<sup>th</sup> Edition

## SEMESTER I CORE PAPER - IV

### ADVANCED FOOD MICROBIOLOGY

**Hours/week - 6**

**Credit -5**

**Max Marks-100**

### OBJECTIVES

To enable students

- To gain deeper knowledge of role of micro-organisms in Food Processing
- To understand the importance of micro-organisms in food spoilage and to learn advance techniques used in food preservation
- To understand the latest procedures adopted in various food operations to prevent food – borne disorders and legal aspects involved in these areas.

**Unit 1:**

General Microbiology – Fundamental Principles – Methods of Isolation and detection of Microorganisms or their products in food-ELISA,PCR-only principles in brief.

**Unit 2:**

Food Microbiology – Microbiological analysis of foods, Food Microbiology study and control of food spoilage.Source of food contamination, factors responsible for food spoilage. Spoilage of different foods – Cereals and Cereal Products, Vegetables and fruits, seafood's, egg., Meat and Canned foods, Milk and Milk product.

**Unit 3:**

Fermentation – Introduction – Advantages – Factors affecting – Alcoholic fermentation – Concepts in the production of Wine, Beer, Traditional foods, uses of yeast in bakery, production of organic acids, Vinegar and cheese making.

**Unit 4:**

Food borne diseases – Bacterial – Viral – Measure to prevent Food borne diseases – Toxins – Mycotoxins .Disinfection-methods of disinfection-natural, physical and chemical

**Unit 5:**

Handling of foods – Role of microorganisms in mobile food units – Street foods – Vending machines – Outdoor catering – Contamination of food, equipments& Handlers, Personal hygiene & Sanitation – Sewage Disposal.Indicators of food safety and quality.

**REFERENCES**

1. Pelezar, M.I. and Reid, R.D. (1993) Microbiology McGraw Hill book company, New York, 5<sup>th</sup> Ed.
2. Atlas.M.ronald (1995) Principles of Microbiology, 1<sup>st</sup> Ed. Mosby – year book, Inc. Missouri, USA.
3. Topely and Wislon's (1983) Principles of Bacteriology, Virology and Immunity, Edited by S.G.Wilson.A, Miles and M.T.Parkar, Vol.1:GeneralMicrobiolgy and Immunity, 2:Systematic Bacteriology, 7<sup>th</sup> Ed. Edward Arnold publisher.
4. Block.J.G (1999) Microbiology Principles and Explorations, 4<sup>th</sup> Ed. john Wiley and Sone Inc.
5. Frazier.W.C. (1998) Food Microbioogy, McGraw Hill Inc. 4<sup>th</sup> Ed.
6. Jay.James.M(2000) Modern Food Microbiology, 6<sup>th</sup> Ed. Aspen publishers, Inc. Maryland.
7. Banwart.G. (1989) Basic Food Microbiology, 2<sup>nd</sup> Ed. CBS Publisher.
8. Garbnutt.J (1997) Essentials of Food Microbiology, 1<sup>st</sup> Ed., Arnold International students Ed.
9. Doyle, P.Benehat. L.R. and Mantville, T.J. (1997): Food Microbiology, Fundamentals and Frontiers, ASM Press, Washington DC.
10. Adams.M.R. and M.G. Moss (1995) Food Microbiology, 1<sup>st</sup> ed., New age international private Ltd.
11. Benason.H.J. (1990) Microbiological applications, C. Brown publishers USA.
12. Roday.S. (1999) Food Hygiene and sanitation, 1<sup>st</sup> Ed. Tata McGrawRoday.S. (1999) Food Hygiene and sanitation, 1<sup>st</sup> Ed. Tata McGraw Hill, New Delhi.

**SEMESTER: I**  
**ELECTIVE PAPER I**  
**BIOCHEMICAL CHANGES IN DISEASES**

**Hours/week: 4**

**Credits:4**

**Max marks: 100**

**Objectives**

This course will enable the students to:

1. Understand the pathophysiological changes in different organs, tissues and systems in different disease conditions across the lifespan
2. Comprehend the implications of functional interrelationships in a diseased body
3. Know and interpret the various diagnostic indicators/parameters
4. Apply this knowledge for planning nutritional care of individuals

**UNIT 1: Basic concepts of pathophysiology and metabolism of adaptation -**

Fluid and electrolyte, acids and bases, Immunity, Inflammation, Hypersensitivity, Infection and Immunodeficiency.

Cellular Proliferation and Cancer: Biology of Cancer, Tumor spread and treatment, Clinical manifestations of cancer

Alterations of Haematologic functions: Nutritional Anemias Erythropoiesis and haemoglobin synthesis Nutrients involved in erythropoiesis. Classifications of Anemias and Nutritional Care i) Normocytic anemia – aplastic anemia, ii) Megaloblastic anemia, iii) Microcytic anemia, iv) Sickle cell anemia and Thalassemia v) Hemolytic anemia.

**UNIT 2**

**Pathophysiology of Cardiovascular, lymphatic and pulmonary system:** Alteration of cardiovascular functions, atherosclerosis, arteriosclerosis, Thrombus, embolus, dysrhythmias. Myocardial ischemia, Myocardial infarction, Heart failure, Stroke, Hypertension, Dyslipidemias.

Intestinal transport of lipids, Cellular uptake and metabolism of lipids, (beta-oxidation, denovo synthesis of fatty acids, synthesis and breakdown of unsaturated fatty acids, cholesterol, phospholipids and triacylglycerol). Lipoprotein metabolism, VLDL and LDL and HDL. Regulation of lipid metabolism at substrate level, enzyme level, hormonal level and organ level. Disorders of lipid metabolism. Dyslipidemias. Lipid storage diseases.

**UNIT 3**

**Manifestations of gastrointestinal dysfunction:** Acute and chronic gastritis, Ulcers, Malabsorption syndrome. Pancreatic insufficiency and Pancreatitis. Ulcerative colitis, Crohn's disease. Liver dysfunction, Hepatitis, Cirrhosis, Cholelithiasis.

**Alteration of hormonal regulation:** Hypo and Hyperfunctions of Pituitary, Adrenal cortex and medulla, Hypo and Hyperthyroidism. Hypocalcaemia. Functions of the adrenal cortex, thyroid and parathyroid gland, their insufficiencies, clinical symptoms and metabolic implications. Dietary treatment as supportive to other forms of therapy.

#### **UNIT 4**

**Disorders of carbohydrate metabolism:** Regulation of carbohydrate metabolism at substrate level, enzyme level, hormonal level and organ level. Blood glucose monitoring, ii) Glycosylated hemoglobin, iii) Urine testing. Blood sugar lowering agents i) Oral hypoglycemic agents ii) Insulin, iii) Exercise. Acute complications – pathophysiology, diagnosis, types, treatment. i) Hypoglycemia, ii) Ketoacidosis, iii) Somogyi effect, iv) Dawn phenomenon. Long term complications- pathophysiology, diagnosis, types, and treatment i) Macrovascular ii) Microvascular.

#### **UNIT 5**

**Disorders in Metabolism of amino acids:** Protein amino acids, non-protein amino acids (including urea cycle, transamination, one-carbon metabolism). Creatine and creatinine. Inborn errors of amino acid metabolism. Uremic Renal Failure - General importance of protein nutrition in renal failure and uremia. Causes and Dietary management in Acute Renal Disease, Chronic Renal Disease. Sodium and Potassium Exchange list. Types of dialysis and their nutritional care – Haemodialysis, CAPD, Continuous Ambulatory peritoneal dialysis). Renal Transplant and its nutritional care. Nephrolithiasis- etiology, types of stones and nutritional care (acid & alkaline ash diet).

#### **References:**

1. Mohan, V, Rema, M, Unnikrishnan, R. (2009) Dr. Mohan's Handbook of Diabetes Mellitus, Elsevier India Ltd., Noida.
2. Staci Nix Williams, (2009) Basic Nutrition and Diet Therapy, Mosby Inc Elsevier.
3. Mahan K & Sylvia Escott-Stump (2008) Krause's Food, Nutrition and Diet Therapy, 12<sup>th</sup> edition, Saunders Elsevier Inc. Canada, ISBN 978-0-8089-2378-7.
4. Mosby's Manual of Diagnostics and Laboratory Tests (2006) Elsevier.
5. Murray, R.K., Granner, D.K., Mayes, P.A. and Rodwell, V.W. (2000): 25th Ed. Harpers Biochemistry. Macmillan Worth Publishers.
6. Nelson, D.L. and Cox, M.M. (2000): 3rd Ed. Lehninger's Principles of Biochemistry, Macmillan Worth Publishers.
7. Devlin, T.M. (1997): 4th Ed. Text book of Biochemistry with Clinical Correlations, Wiley Liss Inc
8. Stryer, L. (1998): 4th Ed. Biochemistry, WH Freeman and Co.
9. Conn, E.E., Stumpf, P.K., Bruening, G. and Doi, R.H. (2001): 5th Ed. Outlines of Biochemistry, John Wiley and Sons.
10. Voet, D. Voet, J.G. and Pratt, C.W. (1999). Fundamentals of Biochemistry.
- 11. Journals:**
12. Journal of American Dietetic Association.
13. British Journal of Dietetics.
14. Asia-Pacific Journal of Clinical Nutrition.
15. Journal of Academy of Nutrition and Dietetics



16. Indian Journal of Nutrition and Dietetics.

**17. Websites:**

18. [www.eatright.org](http://www.eatright.org)

19. [www.nutrition.gov](http://www.nutrition.gov)

20. [www.choosemyplate.gov](http://www.choosemyplate.gov)

21. [www.nutritioncare.org](http://www.nutritioncare.org)

22. [www.diabetesindia.org](http://www.diabetesindia.org)

23. [www.cronometer.com](http://www.cronometer.com)

**SEMESTER: II  
CORE PAPER – V  
ADVANCED DIETETICS**

**Hours/week: 8**

**Credits:6**

**Max marks: 100**

**OBJECTIVES**

To enable the students to

1. Understand the etiology, physiology and metabolic anomalies of acute and chronic diseases and patient needs
2. Know the effect of the various metabolic conditions on nutritional status, nutritional and dietary requirements
3. Obtain knowledge on therapeutic diets and to develop capacity and attitude for taking up dietetics as a profession

**Unit - I**

**Nutritional screening and assessment:**

Identification of high risk patients. Assessment of patient needs based on clinical, biochemical and anthropometric data. Newer trends in delivery of nutritional care techniques, feeding substrates and dietary counselling.

Nutrient Drug interaction – Effect of food, nutrients and nutritional status on drug dosage and efficacy. Medical Nutrition Therapy for immunodeficiency disorders.

**Unit - II**

Diabetes mellitus - Metabolic pattern of type 1 and type-2 diabetes. Abnormal metabolism in uncontrolled diabetes. Long term complications of diabetes and its management. Nutritional recommendations for management of diabetes – meal planning, food exchange system, carbohydrate counting, insulin carbohydrate ratio, portion control, dietary fibre, glycemic index and glycemic load.

Cancer – pathophysiology, medical nutrition therapy. Nutrition and Carcinogenesis. Nutraceuticals in cancer prevention. Nutritional impact of cancer treatment and its management.

**Unit - III**

Nutrition in Weight imbalance – over weight, underweight, unintentional weight loss. Determination of Total energy requirement. Role of complex carbohydrates. Macro modification in diet planning. Nutritional management of hormonal imbalance – PCOD, hypo and hyperthyroidism.

Pathophysiology of atherosclerosis and coronary heart diseases. Lipoproteins and hyperlipidemia – risk factors and prevention. Pathophysiology of hypertension – primary prevention and nutritional management.

#### **Unit - IV**

Etiopathophysiology, metabolic and clinical aberrations of kidney diseases; glomerular filtration rate, microalbuminuria. Proteinuria. Prevention and recent advances in the medical nutritional management of Renal disorders – Acute and chronic glomerular nephritis, Nephrotic syndrome, Renal stones, End Stage Renal Disease and Dialysis.

#### **Unit - V**

Pathophysiology and nutritional management of Liver, gall bladder, pancreatic disorders – Jaundice, cirrhosis, Hepatic coma, gall bladder stones, Acute and chronic pancreatitis.

Nutritional management of Neurological disorders – Parkinson, Epilepsy, Alzheimer's syndrome, Metabolic disorders – PKU, maple syrup disease, Glycogen storage diseases, Nieman-pick disease and Faber's disease, Gout.

#### **Gastrointestinal Diseases**

Etiology, clinical findings and dietary modifications for GERD, peptic ulcer, ulcerative colitis, Tropical sprue, celiac disease, irritable bowel syndrome.

#### **References:**

1. Judith Brown, Jennifer Kosto (2008) Nutrition Now-Interactive Learning Guide for Students, International Student edition.
2. Mohan, V, Rema, M, Unnikrishnan, R. (2009) Dr. Mohan's Handbook of Diabetes Mellitus, Elsevier India Ltd., Noida.
3. Staci Nix Williams (2009). Basic Nutrition and Diet Therapy, 13<sup>TH</sup> ed. CV Mosby Inc.
4. Mahan K & Escott-Stump S (2012) Krause's Food, Nutrition and Diet Therapy, 13<sup>th</sup> edition, Saunders Elsevier Inc. Canada, ISBN 978-0-8089-2378-7.
5. Mosby's Manual of Diagnostics and Laboratory Tests (2006) Elsevier.

#### **Journals:**

Journal of American Dietetic Association.  
British Journal of Dietetics.  
Asia-Pacific Journal of Clinical Nutrition.  
Journal of Academy of Nutrition and Dietetics  
Indian Journal of Nutrition and Dietetics.

**Websites:**

[www.eatright.org](http://www.eatright.org)

[www.nutrition.gov](http://www.nutrition.gov)

[www.choosemyplate.gov](http://www.choosemyplate.gov)

[www.nutritioncare.org](http://www.nutritioncare.org)

[www.diabetesindia.org](http://www.diabetesindia.org)

[www.cronometer.com](http://www.cronometer.com)

**SEMESTER: II**

**CORE PAPER V  
ADVANCED DIETETICS PRACTICAL**

**Hours/week: 3**

**Credits: 2**

**Max marks: 100**

**Objectives:**

The practical exercises are aimed to facilitate the students to

- Understand the techniques in assessment of nutritional needs for different therapeutic conditions
- Imbibe the skill set in planning therapeutic diets of higher order
- Practice the use of exchange lists, ready-reckoners and digital applications in planning diets

1. Deriving energy requirements and planning diet for obese and underweight individuals.
2. Planning and preparing diets for the following conditions  
IBD – celiac disease and IBS – Lactose intolerance.
3. Planning and preparing diet for Type I and II Diabetes conditions with and without complications and on different drug therapy - carbohydrate counting, food exchange lists, ready reckoner based diet.
4. Planning and preparing diet for Liver failure condition - fat restricted diet.
5. Planning and preparing diet for individual with hypertension – sodium restricted diet.
6. Planning and preparing diet for renal failure – fluid and protein restricted diet
7. Planning and preparing diet for post-burn condition – high calorie and protein diets.
8. Planning and preparing diet for HIV with and without co-morbidities – protein and vitamin rich diet.
9. Planning and preparing diet for poor nutritional status in cancer patient – nutraceutical based diet.
10. Planning and preparing diet for hyperlipidemias – macro modified diet.

**SEMESTER II  
CORE PAPER - VI  
HOSPITALITY ADMINISTRATION**

**Hours/week:7**

**Credits:5  
Max marks:100**

**OBJECTIVES**

- To acquaint the students with housekeeping department and its management in the hospitality industry.
- To enable students to manage resources in the housekeeping department to fulfill the hospitality function.

**CONTENTS**

**UNIT -I : Types of Institutions Offering Hospitality Services**

Evolution, importance, recent development, factors influencing the growth.

**Importance of front office in hospitality industry:** Front office operations — qualities, 'attributes' and duties of front office personnel, Co-ordination & communication between front office and other departments, front office personnel and guests.

**UNIT -II: Frontoffice organisation**

Layout of front office; Organizational structure of the front office and front offices procedures reservation, cancellation, handling baggages, messages and materials of guest. Other services offered from the front office valet, tours, travel, cash exchange

**Hospitality Function:** Role of housekeeping in hospitality industry and Housekeeping in relation to commercial and welfare section.

**UNIT III : Management of Housekeeping Department :**

Layout of housekeeping department. Planning, organization and communication of housekeeping activities. Coordination with other departments. Roles/responsibilities of personnel in the house keeping department, **Linen Management** Selection of linen, uniforms, types, selection, distribution and control. Hostess Training: General traits of a Hostess, various types of services, Identification of glasswares and crockery.

**UNIT -IV : Safety and Security Management:** Safety, Security and Sanitation : Safety, fire fighting, and first aid safety in equipment use, pest control, and sanitation standard.

**UNIT -- V : Communication System and Maintenance**

Public address system, intercom system, music and television

**Maintenance:** Repairs and redecoration programmes. Computers in hospitality management

## REFERENCES

- 📖 Andrews Snoher (1978); Hotel Housekeeping Training Manual, Tata McG Hill Publication Co. Ltd., New Delhi.
- 📖 Branson, C.J. and Lennox, M (1988); Hotel, Hotel and Hospital
- 📖 Housekeepi 5<sup>th</sup> Edition, Redwood Books, Trowbridge Wishhire, London.
- 📖 R.Lewis, T. Begg's, M. Shaw, S. Croffot (1986); The Practice of Hospital Management, Vol I and II, AVIPublishing Co. Inc, Westport Connecticut.
- 📖 S.Andrews .(1995); Hotel Housekeeping Training Manual, Tata McGraw Hi Publishing Company Limited, New Delhi.
- 📖 Ursula Jones and Newtons: Hospitality and Catering.
- 📖 Andrews, S. (1982) Hotel Front Office Training Manual, Tata McGraw HilNew Delhi.

## SEMESTER: II

### COURSE PAPER - VII RESEARCH METHODOLOGY

**Hours /week: 6**

**Credits:5**  
**Max marks: 100**

## OBJECTIVES

- To understand the significance of research methodology in Home Science research.
- To understand the types, tools and method of research and develop the ability to construct data gathering instruments appropriate to the research design.

### UNIT1: Introduction to Research Methods

Meaning — Definition — Objectives of research — Types of research — Historic, Exploratory and descriptive, Experimental, Survey and Case study - Advantages and limitations of research — Pre requisites for conducting research.

### UNIT 2: Steps in Research

Identification of a problem, devising a research question, objectives of study, formulation of hypothesis, limitations and delimitations of the problem.

Defining the variable types - independent and dependent variables

Data gathering instruments: observation, questionnaire, interview, case study, scaling methods, home visits. Reliability and Validity of measuring instruments.

### UNIT 3: Research methods: Types of Sampling and Data collection techniques

Sampling — Sampling methods and techniques – Random sampling methods – Determining sample size – ‘rules of thumb’.

Collection of data, sources of data — Primary and Secondary data. Scales of Measurement: nominal, ordinal, interval and ratio. Statistical Techniques: Non-Parametric and Parametric tests.

#### **UNIT 4: Principles and Types of Research Design**

Non-Experimental research designs – Observational, Cross-sectional, Longitudinal, Case study, Correlational and Quasi-experimental; Experimental research design – independent and dependent variables. Characteristics of good experimental design. Types – between subjects, within subjects, matched group, factorial. Developing a Conceptual framework.

#### **UNIT 5: Critical analysis of research**

Writing a research proposal. Research Report - Purpose and types of reports - Introduction, Review of literature, Methodology, Results and Discussion, Summary, Bibliography. Recent techniques in research report preparation.

##### **References:**

1. Bandarkar, P.L. and Wilkinson T.S. (2000). Methodology and Techniques of Social Research, Himalaya Publishing House, Mumbai.
2. Bhatnagar, G.L. (1990). Research Methods and Measurements in Behavioural and Social Sciences, Agri. Cole Publishing Academy, New Delhi.
3. Kothari, C.R. (2002), Research Methodology - Methods and Techniques.
4. Edwards, T. (2011). Research Design and Statistics – a Bio-Behavioural Focus, Tata McGraw Hill Education Pvt. Ltd., New Delhi.

### **SEMESTER: II ELECTIVE PAPER II FOOD PROCESSING**

**Hours/week: 6**

**Credits:4  
Max marks:100**

#### **OBJECTIVES**

This course is designed to:

- Impact 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 about the standards for food quality.

#### **UNIT – 1**

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 effect of food constituents, types of thermal treatments.

Refrigeration – refrigeration, cool storage and shelf life extension; cool storages with air circulation, humidity control and gas modification .

Freezing – changes during freezing – rate of freezing, choice for final temperature for frozen foods, freezing methods, freezing effects.

## **UNIT – 2**

Dehydration – dehydration, water activity and food safety/quality; methods of dehydration. Types of driers.

Ionizing radiations – Forms of radiant energy; ionizing radiations, sources and properties; radiation units; radiation effects, limiting indirect effects; dose fixing factors; objectives in food irradiation, safety and quality of irradiated food

## **UNIT – 3 :**

Processed food products-Jams, jellies, marmalade, squashes, concentrates, preserves, juices, ketchup, sauces, cereal products, soy products.

Food technology procedures — Enrichment, fortification, extrusion; extraction, retining, hydrogenation, sterilization, pasteurization, homogenization, standardization; ageing, curing, smoking, salting, tenderizing, germination, malting, parboiling.

Packaging — Concepts, Definition, Significance, Classification, Materials used for Packaging — Properties and application,

## **UNIT — 5**

Food Quality Control — definition, standards for quality, methods for determining quality, factors affecting food quality.

Food laws and regulations-International laws ,-. WHO, / FAQ Codex.Alimentations, FDA, FDC, other standards; National laws — PPA, MPO, FPO; Standards — Voluntary, Mandatory.

## **REFERENCES**

- 📖 Gould, G.W. (1995); New Methods of Food Preservation, Blackie Academic & Professional, London.'
- 📖 Arthey, D. and Ashurst P.R. (1996); Fruit Processing, Mackie Academic & Professional, London...
- 📖 Von Leosecke, , "HW. (1988); Food Technology Series: Drying and Dehydration of Foods, Allied' Scientific Publishers.
- 📖 Fellows, P.J. (2000); Food Processing Technology: Principles and Practice, Second Edition, CRC Wood head Publishing. Ltd cambridge.
- 📖 Salunkhe, D.K. and S.S...-Kadam .(-1995); Handbook of Fruit Science and Technology: Production, Composition, Storage and Processing, Marcel Dekker INC, New York.
- 📖 Peter Fellows (ed) (1997); , Traditional Foods: Processing for Profit; Intermediate Technology Publications, London.

- 📖 Harris, R.S. and Karnias, E. (1975); Nutritional Evaluation of Food Processing, AVI Publishing Co., Westport, Connecticut.
- 📖 Tannerbaum, S.R., Nutritional and Safety Aspects of Food Processing, Marcel New York.
- 📖 Kokini, J.L., Ho, C.T. and Karwe, M.V., Food Extension Science , and Technology, Marcel Dekker INC: New York.

### **SEMESTER III**

#### **CORE PAPER - VIII**

#### **FUNCTIONAL FOODS AND NUTRACEUTICALS IN PREVENTIVE DIETETICS**

**Hours/week:6**

**Credits:5**

**Max marks:100**

#### **UNIT I : Functional Foods and Nutraceuticals**

Introduction, Definitions — Functional foods, Nutraceuticals, Medical foods, prebiotics, probiotics, synbiotics and their importance.

#### **Functional Foods and Coronary theart Disease**

Introduction, Functional foods in the control of CVD, Effects of probiotics on blood lipids and on coronary heart disease.Effect of synbiotics in coronary heart disease.

#### **UNIT 2 : Functional foods and Cancer**

Genetic / endogenous / exogenous risk factors, Nature of tumour growth and models of carcinogenesis. Diet and gene interaction.Role of functional foods — Nutrients — Vitamins, Phytochemical, Glucosinolates, Phytoestrogen, Dietary fibre, synbiotics and cancer.

#### **Functional foods in GI disorders**

Functional food for Gut Health. Types of pro and prebiotics and their influence in health, Pre and probiotics in optimizing gut health.

#### **UNIT 3: Health aspects of functional colonic foods**

Definition – Cololnic Food - Metabolism of colonic foods.

#### **Functional Foods mid Bone Health**

Definition and epidemiology of Osteoporosis, Bone Growth and factors affecting e mass, Dietary strategies for preventing osteoporosis - Minerals, vitamins, proteins. Impact of genetic variation and diet in preventing osteoporosis. Role of functional foods in— Bone Health.

#### **UNIT 4 : Functional Foods and Oral Health**

Key dietary factors in oral health.Effects of ageing on oral health.Dietary arteries in oral health.

Relationship between dental caries and dietary carbohydrates. Relation between rose consumption and dental carries. Functional foods for promoting oral health.



### **Functional Foods and Immune Health**

Immune system in Health, Disease and ageing. Dietary fatty acids and amatory diseases; Targeting immune function and inflammation. Fatty acid enriched functional foods in immune function stem. Host - microbe interaction.

### **UNIT 5:Functional Foods and Obesity**

Nutrient - Gene interaction in control of obesity. Nutrition fat synthesis and obesity. Role of functional foods in obesity. Functional Foods in Mood, Performance and ageing.

### **REFERENCES**

- 📖 MaryK. Schimdl and Theodre P.,Labuza; Essentials of Functional Foods 2000, Culinary and Hospitality industry Publication Services.
- 📖 C. Remade and B.Reusens,(2000) Functional Foods, Aging and Degenerative Diseases, Culinary &HospitlityPublicationsServices.

### **SEMESTER: III CORE PAPER IX DIETETIC INTERNSHIP**

**Hours/week: 6**

**Credits:5**

**Max marks: 100**

**Place of Internship: Minimum 300-500 bed multi-speciality hospital with a functioning dietary department and diet kitchen**

#### **Objectives:**

The dietetic internship is aimed to facilitate the students to

- Gain knowledge in the functioning of a dietary department
- Gain hands-on experience in the roles and responsibilities of dietitians
- Develop skills to assess patients' nutritional needs and plan suitable diets
- Learn diet counseling skills
- Know the trends in diet supplements and substitutes

1. Nutritional screening and Nutritional Assessment techniques.
2. Interpretation of patient data and diagnostic tests and drawing up of patient diet prescription, using a case study approach.
3. Preparation of diet counseling aids for common disorders.
4. Planning diets for patients with common multiple disorders and complications and discharge diet plans.
5. Planning, preparing and monitoring special feeding. Use of parenteral feeds and nasal /tube feedings.
6. Manage– Medical, Surgical, Obstetric, Neonatal and Paediatric specialties.
7. Monitoring diet setting in diet kitchen.

8. Patient counselling methods and strategies. Follow up program to evaluate acceptability of diet prescription, compliance, discharge diet plan.
9. Case study of specific disease conditions, related diet counselling and evaluation.
10. Market survey of commercial nutritional supplements and nutritional support substitutes.

**Report to be submitted in the hospital:** Submit a bound copy of the word-processed, printed internship report to the dietician for evaluation at the end of the internship.

**SEMESTER III  
CORE PAPER- X  
CLINICAL INVESTIGATION**

**Hours/week:6**

**Credit: 2  
Max marks:100**

1. Collection and storage of biological samples for clinical investigations.
2. Commonly used tests for diagnosis of various diseases.
  - ❖ Qualitative Analysis – sugar in urine acetone, acetic acid in blood, Urea, Protein, Uric acid, Creatinine and albumin in Urine.
  - ❖ Quantitative Analysis – Glucose in blood, Cholesterol in blood, Urea in Blood and Urine.

Demonstration – Serum, bilirubin  
Observation - Dialysis

1. Microscopic examination of blood TC – DC of WBC, RBC count.

**SEMESTER III  
EFFECTIVE PAPER- II  
BIO-STATISTICS AND COMPUTER APPLICATION**

**Hours/week :6**

**Credits:5  
Max marks:100**

**UNIT - I : Tabulation**

Tabulation of data - graphic and diagrammatic presentations (Bar diagrams, Pie diagrams, Pictograms, graphs etc.).

**Analysis of Data**

Measures of central tendency - Arithmetic mean, advantages and methods of, calculation, Geometric mean, Harmonic 'mean; 'median - quartiles, significance and calculation, mode - application of mode, advantages, calculation.

**UNIT - II : Measures of Dispersion**

Mean deviation, standard deviation and co:efficient of variation.

## **Correlation Analysis**

Correlation - Meaning, types of correlation, methods of measuring correlation, algebraic methods (Karl Pearson's coefficient of correlation and Spearman's Rank Correlation).

## **UNIT III : Regression Analysis**

Regression - Meaning, Kinds of regression, Methods of measuring regression, Linear and Parabolic equations - X upon Y and Y upon X (least square assumptions) - estimation of variables, Difference between correlation and Regression.

### **Probability**

Introduction to probability, terms in probability (Exhaustive five cases, mutually exclusive events, dependent and independent etc.).

## **UNIT - IV : Theoretical Distributions or Probability**

Addition and Multiplication Theorems, Expected frequencies – Binomial distribution Poisson distribution and Normal probability distribution.

## **Tests of Significance**

Introduction — Hypothesis testing, Null and alternative hypothesis, types of errors in hypothesis testing — Small sample tests and large sample tests, one tail tests and two tail tests. (t — test and z — test).

## **UNIT V :**

Test of significance — Chi Square Test and F test, Anova — One way, two way.

### **Statistics and Computer**

Application of modern tools like statistical packages (SPSS, Lotus 123, Access, Excel, Visual Fox pro etc.)

## **REFERENCES**

- 📖 Kothari C.R., (1990) Research Methodology, Methods and Techniques, Wiley Eastern Limited, New Delhi.
- 📖 Agarwal, Y.P.(1990) Statistical Methods, Sterling Publishers Pvt. Ltd..
- 📖 Gupta S.P. (1996) Statistical Methods, Sultan Chand & Sons, New Delhi.
- 📖 Sancheti, D.C. and Kapoor, V.K.(1993) Statistics, Theory, Method and Application, Sultan Chand & Sons, New Delhi.

**SEMESTER III**  
**NON MAJOR ELECTIVE**  
**NUTRITION FOR HEALTH AND FITNESS**  
**Hours/week – 2 Credits-2**  
**Marks-100**

**OBJECTIVES**

This course will prepare the students to:

1. Understand the components of health and fitness and the role of nutrition in exercise regimes for pre and post — natal fitness.
2. Make nutritional, dietary and physical activity recommendations to achieve fitness and well being.
3. Develop ability to evaluate fitness and well being.

**UNIT —1:** Definitions, Components of Fitness -Introduction to fitness and training, benefits of exercise, components of fitness, Specific fitness in health status. Energy input and output. Effect of specific nutrients on work performance and physical fitness.

**UNIT — 2: Nutrition, exercise, physical fitness and health**

Review of different energy systems for endurance and power activity, Nutrition in weight management, BMI body composition, weight imbalance-overweight underweight, unintentional weight loss. Fuels and nutrients support to physical activity, Shifts in carbohydrate and fat metabolism, Mobilisation of fat stores during exercise.

**UNIT — 3: Nutrition in sports**

Sports specific requirement, Diet manipulation, Pre-game and post-game meals. Assessment of different nutrigenic electrolyte aids and commercial supplements. Weight cycling. Water and balance (Losses and their replenishment during exercise and sports events, effect of dehydration, sports drink).

**UNIT- 4;**

Nutrition and exercise regimes for pre and post — natal fitness Significance of physical fitness and nutrition in the prevention and management of weight control, obesity, diabetes mellitus, CV disorders, bone health and cancer.

**UNIT 5: DIET AND LIFE STYLE MODIFICATIONS**

Alternative systems for health and fitness in yoga, Meditation, Vegetarianism. Role of nutrition in Stress management. Self help plan for life style changes. Types of diet in weight maintenance

## PRACTICALS

1. Assessment of nutritional status including body composition.
2. Physiological parameters like heart rate and blood pressure.
3. Planning diets and formulating dietary guidelines for:
  - Fitness and health
  - Prevention of chronic degenerative disorders
  - Obesity management
  - Management of diabetes mellitus and CVD.
4. Review of existing alternative diet related systems for physical fitness and health

## REFERENCES

- 📖 Mahan, L.K. & Ecott — Stump, S. (2000) Krause's Food, Nutrition and Diet. Therapy, 10<sup>th</sup> edition, W.B. Saunders Ltd.
- 📖 Whitney E.N. & Rolfs, S.R. (1999), Understanding Nutrition, 8<sup>th</sup> edition, West/ Wadsworth, An International Thomson Publishing Co.,
- 📖 Ira Wolinsky (ED) (1998), Nutrition in Exercise and sports, 3<sup>rd</sup> edition, CF Press.
- 📖 Parizkova, J. Nutrition, Physical activity and health in early life, Ed'. Wolinsky, CRC Press.
- 📖 Shills, M.E. Olson, J.A., Shike, N. and Ross, A.C. (Ed), (1999), Modern Nutrition in health and Disease, 9<sup>th</sup> edition, Williams & Wilkins.
- 📖 McArdle, W. Katch, F. and Katch, V. (1996), Exercise Physiology, Energy Nutrition and Human Performance, 4<sup>th</sup> Edition, Williams and Williams and Wilkins, Philadelphia.

## JOURNALS

- ❖ Medicine and Science in Sports and Exercise.  
International journal of Sports Nutrition

**SEMESTER IV  
CORE PAPER XI  
FOOD PRODUCT DEVELOPMENT AND MARKETING**

**Hours/week: 6**

**Credits: 5**

**Max marks:100**

**OBJECTIVES**

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.

**CONTENTS**

**UNIT -1: New Food Products**

Comparison of traditional and modern food habits - generation of new product idea, new products; definition - classification and characterization - social and health concerns - calories - hygiene factors - nutrition - balanced diet.

**New Food Product Planning and Development**

Reasons for new food product development (influence of corporate, market, technology and government) – determination of needs from various perspectives.

**UNIT 2: New Food Product Development**

Stages in new product development; idea generation — screening — business analysis,

**Screening Procedure**

Sensory evaluation, shelf life testing, product integrity and conformance to standards.

**UNIT 3 :**

Test marketing – Evaluating results and analyzing data.

**Pricing of New Product**

Pricing policies; cost basis (determination of cost through cost sheet) — demand basis — cost demand basis (determination of cost through break — even charts) — competition basis, kinds of pricing — pricing strategies.

#### **UNIT 4: Promotion and Distribution of Products**

Sales promotion — importance — kinds of sales promotion — personal selling — advertising — advertising vs. popularity — advertising medias — channels of distribution — middlemen — importance.

#### **Entrepreneurship**

Choice of production — plant location — investment decisions; return on investment — payback methods — financing the projects — availing of loans from commercial bank and other agencies.

#### **UNIT 5 : Consumer Psychology and Consumerism**

Buying motives — determination of buyer behavior — buying decisions — consumerism — Prevention of Food Adulteration Act 1954, Essential Commodities Act 1955, Packaged Commodities Order 1975.

New products in Food Service Industry & Food Ingredient Industry.

#### **REFERENCES**

- 📖 Fuller, G.W. (1994); New Product Development : From Concept to Market Place  
CRC Press, New York.
- 📖 Man, C.M.D. and Jones A.A. (1994); Self Life Evaluation of Foods, Blackie  
Academic and Professional, London.
- 📖 Q Modern Marketing — R.S.N. Pillai and Bagavathi, S. Chand Publications, New  
Delhi, 2002.

### **SEMESTER IV CORE PAPER XII**

#### **FOOD SAFETY AND QUALITY CONTROL**

**Hours/week :6**

**Credits:5  
Max marks:100**

#### **OBJECTIVES**

To enable students

- To standardize food products through sensory evaluation
- To know the importance of quality assurance in food industry
- To know the various tests and standards for quality control assessment and food safety.

#### **Unit – I**

Sensory evaluation of foods – principles and methods of sensory evaluation and consumer testing of foods.

Sensory evaluation methods – organoleptic tests, flavour studies, their statistical interpretation and relation to physico – chemical studies.

## **Unit – II**

Quality control in the food industry – Principles and methods of quality control in the food industry in relation to food standards and regulation. Quality control – specification.

## **Unit – III**

Food poisoning – Biological and chemical hazards in food with emphasis on principles of food safety, Food Toxicology and Metal contaminants Cross contamination.

## **Unit – IV**

Food Adulteration – International additives, preservatives, stabilizers thickeners, conditioners – fat substitutes and other additives.

Indirect additives – Residues and contaminants. Pests and Pesticides contaminants.

## **Unit – V**

FPO, PFA, Codex, BIS standards and specification HACCP, Agmark, ISI, ISO, APEDA, FDA and MPO.

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