**ANNAMALAI UNIVERSITY**

**220. B.Sc. Nutrition, Food Service Management and Dietetics**

Programme Structure and Scheme of Examination (under CBCS)

(Applicable to the candidates admitted in Affiliated Colleges   
in the academic year 2022 -2023 ONLY)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Course Code** | **Part** | **Study Components & Course Title** | **Hours/Week** | | **Credit** | | **Maximum Marks** | | | | | | |
| **CIA** | | | **ESE** | | **Total** | |
|  |  | **SEMESTER – I** |  | |  | |  | | |  | |  | |
| 22UTAML11 | I | Language Course - I : Tamil – I | 5 | | 3 | | 25 | | | 75 | | 100 | |
| 22UENGL12 | II | English Course - I : Communicative English I | 5 | | 3 | | 25 | | | 75 | | 100 | |
| 22UNFDC13 | III | Core Course - I :Food Science | 4 | | 4 | | 25 | | | 75 | | 100 | |
| 22UNFDC14 | Core Course - II :Human Physiology | 4 | | 4 | | 25 | | | 75 | | 100 | |
|  | Core Practical – I : Human Physiology Practical | 3 | | - | | - | | | - | | - | |
| 22UNBCA01 | Allied - I : Paper – 1 : Nutritional Biochemistry | 4 | | 4 | | 25 | | | 75 | | 100 | |
|  | Allied Practical – I : Nutritional Biochemistry Practical | 3 | | - | | - | | | - | | - | |
| 22UENVS18 | IV | Environmental Studies | 2 | | 2 | | 25 | | | 75 | | 100 | |
|  | **Total** | | | **30** | | **20** | |  | | |  | | **600** | |
|  |  | **SEMESTER – II** |  | |  | |  | | |  | |  | |
| 22UTAML21 | I | Language Course - II : Tamil -II | 5 | | 3 | | 25 | | | 75 | | 100 | |
| 22UENGL22 | II | English Course - II : Communicative English II | 5 | | 3 | | 25 | | | 75 | | 100 | |
| 22UNFDC23 | III | Core Course – III : Human Nutrition | 4 | | 4 | | 25 | | | 75 | | 100 | |
| 22UNFDP24 | Core Practical – I : Human Physiology Practical | 3 | | 3 | | 40 | | | 60 | | 100 | |
| 22UNFDA02 | Allied – II : Paper -2 :Food Product Development | 4 | | 4 | | 25 | | | 75 | | 100 | |
| 22UNBCP01 | Allied Practical – I : Nutritional Biochemistry Practical | 2 | | 3 | | 40 | | | 60 | | 100 | |
| 22UNFDE26 | Internal Elective – I | 3 | | 3 | | 25 | | | 75 | | 100 | |
| 22UVALE27 | IV | Value Education | 2 | | 1 | | 25 | | | 75 | | 100 | |
| 22USOFS28 | Soft Skill | 2 | | 1 | | 25 | | | 75 | | 100 | |
|  |  | Skill development course (SDC)-1:Effective English |  | | 2 | | 25 | | | 75 | | 100 | |
|  | **Total** | | | **30** | | **27** | |  | | |  | | **1000** | |
|  |  | **SEMESTER – III** |  | |  | |  | |  | | |  | |
| 22UTAML31 | I | Language Course – III : Tamil – III | 5 | | 3 | | 25 | | 75 | | | 100 | |
| 22UENGL32 | II | English Course – III : English Through Literature-I | 5 | | 3 | | 25 | | 75 | | | 100 | |
| 22UNFDC33 | III | Core Course – IV :Nutritional through Lifecycle | 4 | | 4 | | 25 | | 75 | | | 100 | |
| 22UNFDP34 | Core Practical – II : Human Nutrition Practical | 3 | | - | | - | | - | | | - | |
| 22UNEEA03 | Allied - II : Paper -1:Extension Education | 4 | | 4 | | 25 | | 75 | | | 100 | |
|  | Allied Practical – II : Food Product Development Practical | 2 | | - | | - | | - | | | - | |
| 22UNFDE36 | Internal Elective – II : | 3 | | 3 | | 25 | | 75 | | | 100 | |
| 22UNFDN37 | IV | Non-Major Elective – I : | 2 | | 2 | | 25 | | 75 | | | 100 | |
| 22UNFDS38 | Skill Based Subject – I : | 2 | | 2 | | 25 | | 75 | | | 100 | |
|  |  | **Total** | **30** | | **21** | |  | |  | | | **700** | |

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|  |  | **SEMESTER – IV** |  |  |  |  |  |
| 22UTAML41 | I | Language Course - IV: Tamil – IV | 5 | 3 | 25 | 75 | 100 |
| 22UENGL42 | I | English Course – IV : English Through Literature-II | 5 | 3 | 25 | 75 | 100 |
| 22UNFDC43 | III | Core Course – V : Food Microbiology | 5 | 4 | 25 | 75 | 100 |
| 22UNFDP44 | Core Practical – II : Human Nutrition Practical | 4 | 3 | 40 | 60 | 100 |
| 22UNGCA04 | Allied – II : Paper – 2: **:** Guidance and Counseling | 4 | 4 | 25 | 75 | 100 |
| 22UNFDP02 | Allied Practical – II : Food Product Development Practical | 3 | 3 | 40 | 60 | 100 |
| 22UNFDN47 | IV | Non-Major Elective – II : Food chemistry | 2 | 2 | 25 | 75 | 100 |
| 22UNFDS48 | Skill Based Subject – II : | 2 | 2 | 25 | 75 | 100 |
| 22UNMSD02 | IV | MS-Office Essentials |  | 2 | 25 | 75 | 100 |
|  |  |  | **30** | **26** |  |  | **900** |
|  |  | **SEMESTER – V** |  |  |  |  |  |
| 22UNFDC51 | I  II  III | Core Course – VI : Dietetics | 4 | 4 | 25 | 75 | 100 |
| 22UNFDC52 | Core Course – VII : Public Health Nutrition | 4 | 4 | 25 | 75 | 100 |
| 22UNFDC53 | Core Course – VIII : Clinical Nutrition | 4 | 4 | 25 | 75 | 100 |
| 22UNFDC54 | Core Course – IX : Food service layout and equipment | 4 | 4 | 25 | 75 | 100 |
| 22UNFDP55 | Core Practical – III : Dietetics Practical | 3 | - | - | - | - |
| 22UNFDP56 | Core Practical – IV : Therapeutic Nutrition Practical | 3 | - | - | - | - |
| 22UNFDE58 | Internal Elective – III : | 4 | 3 | 25 | 75 | 100 |
| 22UNFDS59 | IVIV | Skill Based Subject – III : | 2 | 2 | 25 | 75 | 100 |
| **22UGENS57** | **Gender Studies** | 2 | 1 | 25 | 75 | 100 |
|  |  | **Total** | **30** | **22** |  |  | **700** |
|  |  | **SEMESTER – VI** |  |  |  |  |  |
| 22UNFDC61 | III | Core Course – X : : Therapeutic Nutrition | 5 | 4 | 25 | 75 | 100 |
| 22UNFDC62 | Core Course – XI :Food processing and Preservation | 5 | 4 | 25 | 75 | 100 |
| 22UNFDC63 | Core Course – XII : Food Service Management | 5 | 4 | 25 | 75 | 100 |
| 22UNFDP64 | Core Practical – III : Dietetics Practical | 5 | 3 | 40 | 60 | 100 |
| 22UNFDP65 | Core Practical – IV: Therapeutic Nutrition Practical | 4 | 3 | 40 | 60 | 100 |
| 22UNFDE66 | Internal Elective – IV : | 4 | 3 | 25 | 75 | 100 |
| 22UNFDS68 | IV | Skill Based Subject – IV : Internship | 2 | 2 | 25 | 75 | 100 |
| 22UEXTA67 | V | Extension Activities | - | 1 | 100 | - | 100 |
|  |  | **Total** | **30** | **24** |  |  | **800** |
|  |  | **Grand Total** | **180** | **140** |  |  | **4700** |

**INTERNAL ELECTIVE COURSES**

|  |  |  |
| --- | --- | --- |
| 22UNFDE26-1 | Internal Elective – I : | Sports Nutrition |
| 22UNFDE26-2 | Women Health and Nutrition |
| 22UNFDE26-3 | Nutracutical and Nutrigrnomics |
| 22UNFDE36-1 | Internal Elective - II : | Computer Application in Research |
| 22UNFDE36-2 | House Keeping |
| 22UNFDE36-3 | Family Dynamics |
| 22UNFDE58-1 | Internal Elective - III : | Entrepreneurial Development |
| 22UNFDE58-2 | Nutrition for the family |
| 22UNFDE58-3 | Programmes for Rural Development |
| 22UNFDE66-1 | Internal Elective - IV : | Hospital Food Service Administration |
| 22UNFDE66-2 | Nutritional Assessment |
| 22UNFDE66-3 | Basics in Research Methodology |

**ALLIED COURSES**

|  |  |  |
| --- | --- | --- |
| 22UNBCA01 | Theory | Nutritional Biochemistry |
| 22UNBCP01 | Practical | Nutritional Biochemistry |
| 22UNEEA03 | Theory | Extension Education |
| 22UNGCA04 | Theory | Guidelines and Counseling |
| 22UNFDA02 | Theory | Food Product Development and Marketing |

**NON-MAJOR ELECTIVE COURSES (NME)**

(Department of Nutrition, Food Service Management and Dietetics offers the following NME to other Departments)

|  |  |
| --- | --- |
| 22UNFDN37 | Principles of Economics |
| 22UNFDN47 | Food Chemistry |

**Credit Distribution**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Part** | **Study Components** | **Papers** | **Credits** | **Total Credits** | **Marks** | **Total Marks** |
| Part I | Languages | 4 | 3 | 12 | 100 | 400 |
| Part II | Communicative English & English | 4 | 3 | 12 | 100 | 400 |
| Part III | Core Courses | 12 | 4 | 48 | 100 | 1200 |
|  | Core Practical | 4 | 4 | 16 | 100 | 400 |
|  | Allied Courses | 4 | 4 | 16 | 100 | 400 |
|  | Allied Practical | 2 | 3 | 6 | 100 | 200 |
|  | Internal Electives | 4 | 3 | 12 | 100 | 400 |
| Part IV | Environmental Studies | 1 | 2 | 2 | 100 | 100 |
|  | Value Education | 1 | 1 | 1 | 100 | 100 |
|  | Soft Skill | 1 | 1 | 1 | 100 | 100 |
|  | Gender Studies | 1 | 1 | 1 | 100 | 100 |
|  | Non Major Electives | 2 | 2 | 4 | 100 | 200 |
|  | Skill Based Courses | 4 | 2 | 8 | 100 | 400 |
| Part V | Extension Activities | 1 | 1 | 1 | 100 | 100 |
|  |  | **45** |  | **140** |  | **4500** |

**Skill Based Courses**

Confectionery Technology

Baking Technology

Sensory Evaluation

Internship

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| SEMESTER:1  PART: III | 22UNFDC13: FOOD SCIENCE | CREDIT:4  HOURS/ WEEK 4 |

COURSE OBJECTIVES

1. To know the role of food in health.
2. To enable students to obtain knowledge of different food groups and their contribution to nutrition.
3. To gain insights on the different methods of cooking and their advantages and disadvantages.
4. To apply knowledge on processing of different foods.
5. To gain experience in the preparation of foods with attention to the preservation of their nutritive value - oriented to Indian cooking.

Unit I: Introduction to Foods

Food definition, functions of food, food groups-: energy yielding foods, body building foods, protective foods, classification, five food groups, seven food groups, balanced diet- definition, planning of balance diet, Food Pyramid, Methods of cooking – Moist heat and dry heat methods, advantages and disadvantages.

Unit II: Cereals and Pulses

Cereals: Structure and nutritive value of rice and wheat, Gelatinization, Process of milling and malting -wheat, Rice, Gluten formation, Nutritive value of millets - ragi, bajra.

Pluses: Germination process, factors affecting cooking quality of pulses, composition, nutritive value, and its advantages in cookery, toxins in pulses.

**Unit III: Vegetables and Fruits**

Vegetables – Selection of vegetables, Nutritive value, Changes in nutritive value before and after cooking, Effect of cooking on the vegetable pigments. - chlorophyll, carotenoids, anthocyanin, anthoxanthin.

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

**Unit IV: Milk and milk products, Flesh foods**

Milk and Milk Products: Types of milk, pasteurization of milk, composition and nutritive value, milk products – cheese, paneer and khoa

Egg: Structure, composition and nutritive value, Qualitative determination of egg and its role in cookery.

Meat: Structure, composition and nutritive value of meat, cutting process of meat, cooking changes in meat, and tenderness of meat.

Poultry-classification, Nutritive value, Selection and cooking methods poultry.

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

**Unit V: Fats And Oils, Sugars, Spices, Nuts And Oilseeds**

Fats and Oils- composition of common fats and oils, smoking temperature, rancidity and role of fats and oils in cookery.

Sugar – Nutritive value, sugar related products, stages of sugar cookery, Crystallization, Factors affecting crystallization.

Beverages: classification, nutritive value - coffee, tea, cocoa, milk-based beverages, fruit juices and aerated beverages.

Spices and condiments – Types and use in Indian cookery, Medicinal value.

Nuts and Oilseeds – Types, Composition, Nutritive value, Role in Cookery.

**COURSE OUTCOMES**

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

1. The student will identify and explain nutrients in food and their specific functions
2. Knowledge on nutritive value, understand the cooking quality factors and develop skills in the preparation and storage of various products.
3. Knowledge on nutritional classification, understand the changes in pigments and acquire skills in preserving nutrients and pigments in the processing and storage of vegetables and fruits.
4. Determine the smoking point of any cooking oils and the stages of sugar cookery.
5. Assess the effect of addition of acid, fat, salt, water and sugar on the texture of flesh foods quality.

**Text Books**

1. Srilakshmi, M., (2010).Food science, New Age International (P) Ltd., Publishers.
2. Swaminathan, M., (2005), Food Science, Chemistry and Experimental Foods, Bappco Publisher..
3. Sivasankar B, (2002) Food Processing and Preservation, Prentice-Hall of India Private Limited, New Delhi.
4. Potter, Norman N., and Joseph H. (2012).Hotchkiss. *Food science*. Springer Science & Business Media.
5. Manay S and Swamy S, (2001).Food Facts and Principles, New Age International (P) Ltd Publishers, New Delhi.

**Supplementary Readings**

1. Brown. A. (2000).Understanding Food, Wadsworth, Thomson Learning Publications,
2. Mehas, K.Y., and Rodgers, S. L.,(2000). Food Science and You. McMillan Mcgraw Hill CCompany.
3. Paul, P.C., and Palmer, H. H., (2000).Food Theory and Applications. John Wiley and Sons, New York, Revised Edition.

**OUTCOME MAPPING**

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| --- | --- | --- | --- | --- | --- |
|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | **2** |  |  |  |  |
| **CO2** |  | **2** |  |  |  |
| **CO3** |  |  | **2** |  |  |
| **CO4** |  |  |  | **2** |  |
| **CO5** |  |  |  |  | **2** |

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| SEMESTER: 1  PART:III | 22UNFDC14: HUMAN PHYSIOLOGY | CREDIT:4  HOURS/ WEEK 4 |

COURSE OBJECTIVES

1. To enable students to understand the structure and physiology of various organs in the body.
2. To impart knowledge on blood components and Gastro intestinal secretions.
3. To categorize the functions of various systems in our body
4. To help students to obtain a better understanding of the principles of nutrition and dietetics through the study of physiology.

Unit I: Cell Components and Digestive system

Cell – cell functions. cell structure, and functions - Regulation of cell multiplication. Digestive system – Review of structure and function of various parts in the gastrointestinal tract in brief. Role of liver, pancreas, gall bladder and their dysfunction. Role of specific hormones associated in GI tract.

**Unit II: Respiratory system Hours**

Review of structure and functions. Role of lungs in the exchange and transport of gases. Respiratory volumes**.**

**Unit III: Circulatory system and Excretion organ**

Circulatory system – Composition of blood – the structure of the heart and its working mechanism – conduction of heartbeat. Excretion organ – general organization (including the structure of kidney, nephron, mechanism of urine formation).

**Unit IV: Endocrine system**

Anatomy and physiological functions of endocrine glands: Hormones - Mode of action - Pituitary, Adrenal, Thyroid, Parathyroid, Sex glands, and Pancreas. Hypo and Hyper activities of the glands.

**Reproduction System**

structure, physiological functions of male and female reproductive organs, menstrual and ovarian cycle, spermatogenesis, contraceptives, infertility and its recent developments, Rh factor.

**Unit V: Nervous system**

Review of CNS & ANS, the function of neuron, conduction of nerve impulse, synapse, the role of neurotransmitters. The blood-brain barrier, CSF. Hypothalamus and its role in various body functions –sleep, memory, and obesity.

**Sense organs:**

Review of structure and function skin, eye, ear, nose, and tongue in the perception of stimuli.

**COURSE OUTCOMES**

On successful completion of the course, the students will be able to gain knowledge about:

1. Understand the structure and functions of the various organ systems of the body.
2. Compare the digestive and excretory system and infer the mechanisms of digestion and excretion in human beings.
3. Relate the structure with functions of the tissues and organs.
4. Comprehend the mechanism of action of organs.
5. Discuss the role of hormones and functions of human reproductive system.

**Text Books**

1. Guyton AC & Hall JE, Textbook of Medical Physiology,10th Edition, Harcourt Asia P. Ltd Singapore, 2001
2. Sembulingam, Kirma, and Prema Sembulingam. Essentials of medical physiology. JP Medical Ltd, 2012.
3. Chatterjee CC, Human Physiology, Volume I, 11th Edition, CBS Publishers, New Delhi, 2016.
4. Sathya P and Devanand V, Textbook of Physiology, First edition, CBS Publishers and Distributers Pvt Ltd, New Delhi, 2013.

**Supplementary Readings**

1. Subrahmanyam, Sarada, K. Madhavan kutty, and H. D. Singh. *Textbook of human physiology*. S. Chand Publishing, 1987.
2. Boron WF and Boulpaep EL, Medical Physiology, II edition, Saunders Elsevier, 2009.
3. MariebEN, Human Anatomy and Physiology, VI edition, Pearson edition, 2004.
4. Tortora. G&Grabowski, S.R. Principles of Anatomy & Physiology,10thEdition, John Wiley & Sons, USA, 2003.

**OUTCOME MAPPING**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | **2** |  |  |  |  |
| **CO2** |  | **2** |  |  |  |
| **CO3** |  |  | **2** |  |  |
| **CO4** |  |  |  | **2** |  |
| **CO5** |  |  |  |  | **2** |

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| SEMESTER: I  PART:III | 22UNFDC15: HUMAN PHYSIOLOGY PRACTICAL | CREDIT:0  HOURS/WEEK 3 |

**UNIT I: CELL-TISSUES**

Microscopic study of Tissues-Epithelial,connective,muscular and nervoust issue.

**UNIT II: BLOOD, HEART AND CIRCULATION**

1. Determination of blood ccount.
2. Determination of Blood Grouping.
3. Determination of heart rate and pulse rate
4. Recording of blood pressure
5. Estimation of hemoglobin content
6. Determination of blood group

**UNIT III: RESPIRATORYANDNERVOUSSYSTEM**

1. Structure of Lung and brain
2. Microscopic study of muscular and nervous tissue

**UNIT IV: DIGESTIVESYSTEM&EXCRETORYSYSTEM**

Structure of Liver, Pancreas, Stomach, kidney

**UNIT V: ENDOCRINE AND REPRODUCTIVE SYSTEM**

1. Endocrine Glands–Thyroid, Pituitary, Adrenal and Pancreas.
2. Structure of Ovary and Testis

**COURSE OUTCOMES**

Upon successful completion, students will have the knowledge and skills to:

1. Describe the structure of major human organs and explain their role in the maintenance of healthy individuals.
2. Explain the interplay between different organ systems and how organs and cells interaction
3. To maintain biological equilibrium in the face of a variable and changing environment.
4. Interpret and draw inferences from experimental measures of physiological function including electrocardiograms and spirometer read-outs.
5. Apply experimental design skills to understanding population responses and interpreting quantitative data

**Text Books**

1. Gary.A Thibodeau and Kelvin.T. Patlon, Anthony’s TextBook of Anatomy and Physiology, Seventeeth edition, Mosby Publications, Indiana Print, 2004.
2. Anne Waugh and Allison Grant Ross and Wilson Anatomy and Physiology in Health and Illness Elsevier Publication, Ninth Edition, 2005.
3. Guyton,A.C, TextBook of Medical Physiology, 4th Edition, W.B.Saunders Co. Philadelphia, 1996.

**Supplementary Readings**

1. Waugh A and Grant A. (2012) Ross and Wilson Anatomy and Physiology in Health and Illness. 11th ed. Churchill and Livingston, Elsevier.
2. Vander, A. J., Sherman, J. H. and Luciano, D. S. (1994) Human PhysiologytheMechanisms of Body Functions. 2nd ed. TMH Publishing Co.,Ltd., Boston.
3. Creager, J. G. (1992). Human Anatomy and Physiology. 2nd ed. WMC BrownPublishers, England.

**OUTCOME MAPPING**

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| --- | --- | --- | --- | --- | --- |
|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | **2** |  |  |  |  |
| **CO2** |  | **2** |  |  |  |
| **CO3** |  |  | **2** |  |  |
| **CO4** |  |  |  | **2** |  |
| **CO5** |  |  |  |  | **2** |

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| SEMESTER: 1  PART:IV | 22unBCA01: NUTRITIONAL BIOCHEMISTRY | CREDIT:4  HOURS/WEEK :4 |

COURSE OBJECTIVES

The learners will be able to

1. Understand the role of enzymes in metabolism and clinical conditions.
2. Interpret the significance of macronutrient metabolism, and thereby understand the implications of disorders resulting from these.
3. Acquire skills in qualitative tests and quantitative estimation of nutrients
4. Understand about amino acid.
5. Acquire knowledge about different metabolism.

UNIT I: INTRODUCTION TO BIOCHEMISTRY

Definition and relation to nutrition, Enzyme classification, Nomenclature, Factors affecting enzymatic activity, Mechanism of action. Co- enzyme and prosthetic group- role of B vitamins.

UNIT II: CARBOHYDRATE

Structure, General reactions of mono, di, tri and oligo saccharides, interconversion of sugars, Metabolism of carbohydrate –glucose oxidation through Glycolysis, Krebs-TCA cycle, Pentose Phosphate Pathway, Gluconeogenesis. Inborn errors of metabolism - Fructosuria and galactosemia- in brief.

UNIT III: AMINO ACIDS

Classification, chemical properties due to amino and carboxylgroups. Chromatographic separation. Proteins-primary, secondary, tertiary structure of proteins, Hydrolysis of proteins-Denaturation, precipitation, coagulation. Nutritional classification of proteins General pathways of metabolism of amino acids-Deamination, transamination, decarboxylation – urea cycle, fate of carbon skeleton of amino acids. Inborn errors of metabolism-Phenyl ketonuria, Alcaptonuria, Maple Syrup Urine Disorder

UNIT 1V: LIPIDS AND LIPID METABOLISM

Classification of fats, oxidation of fatty acids, Bio synthesis of fatty acids, ketogenesis. Nutritional importance of Saturated and Unsaturated fatty acids, Triacylglycerols, Phospholipids and Cholestrol

UNIT V: Nucleic acids

Structure and Functions Inter relationship between carbohydrate, fat and protein metabolism – Hormonal regulation of metabolism. Tamilnadu State Council for Higher Education

COURSE OUTCOMES

1. Acquire knowledge on role of carbohydrate in human health
2. Develop knowledge on protein and their effect
3. Understand nutritional important of lipids
4. Develop skills to analyse inter relationship between carbohydrate, fat and protein metabolism
5. Acquire knowledge on composition of body fluids and ways to regulate for normal levels

Text Books

1. Conn, E.E. and Stumpf, P.K. (1981) Outlines of Biochemsirty. 4th ed. Wiley Eastern Ltd., New Delhi.
2. Harvey, R. and Ferrier, D., Lippincott’s Illustrated Reviews: Biochemistry 6th edition, Lippincott Williams and Wilkins, Philadelphia.
3. Lehninger, A.L. (1993) Biochemistry. 3rd ed. CBS Publishers, New Delhi.

Supplementary Readings

1. Murray, R.K., Granner, D.K. and Rodwell, V. W. (2006) Harper’s Illustrated Biochemistry. 27th ed., The McGraw-Hill Companies, Inc., USA.
2. West, E.S., Todd, W.R., Mason, H.S. and Van Bruggen, J.T. (1970) Text book of Biochemistry. 4th ed. The Macmillan Co., New York.
3. Shanmugham Ambika (1985) Fundamentals of bio-chemistry to medical students. NVA Bharat Printers, and traders 56, Peters Road, Madras-86.

OUTCOME MAPPING

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|  | PO1 | PO2 | PO3 | PO4 | PO5 |
| CO1 | 2 |  |  |  |  |
| CO2 |  | 2 |  |  |  |
| CO3 |  |  | 2 |  |  |
| CO4 |  |  |  | 2 |  |
| CO5 |  |  |  |  | 2 |

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| SEMESTER: I  PART: III  PRACTICAI: I | 22UNBCP01:NUTRITIONAL BIOCHEMISTRY PRACTICAL | CREDIT: 3  HOURS/WEEK :3 |

COURSE OBJECTIVES

1. Demonstrate practical skills necessary to conduct laboratory based tests
2. Understand the reactions of nutrients through qualitative experiments
3. Get training on quantitative analysis of various biochemical parameters in body fluids
4. Describe selected and relevant biochemical techniques
5. Knowledge on different types of estimation.

Practical

1. Quantitative analysis of biochemical parameters in body fluids – blood, serum and urine
2. Qualitative tests for carbohydrate – glucose, fructose, lactose, maltose and unknown sugar
3. Quantitative tests for sugar profile – total sugar, reducing and non-reducing sugar
4. Qualitative tests for proteins – albumin, casein and gelatin
5. Qualitative tests for amino acids – tyrosine, cysteine, methionine, tryptophan
6. Quantitative tests for polysaccharides – starch and fbre

Experiments

1. Estimation of urinary creatinine
2. Estimation of urinary urea - diacetyl monoxime method.
3. Estimation of serum protein - Biuret method.
4. Estimation of iron and heaemoglobin
5. Estimation of glucose - 4Orthotoluidine method
6. Reactions of glucose
7. Reactions of fructose
8. Reactions of galactose
9. Reactions of maltose
10. Reactions of lactose
11. Reactions of sucrose
12. Analysis of unknown sugar
13. Estimation of total sugar
14. Estimation of starch and fibre
15. Estimation of amino acids
16. Visit to laboratory
17. Final practical examination

COURSE OUTCOMES

1. Acquire skills in qualitative tests and quantitative estimation of nutrients
2. Quantitatively analyse the biochemical parameters in blood, serum and urine samples
3. Qualitatively identify the presence of macronutrients
4. Demonstrate the various analytical techniques
5. Empower knowledge on different methods of eswtimation.

Text Books

1. Sharma DC, Devanshi Sharma (2017), Nutritional Biochemistry, CBS Publishers & Distributors.
2. Ramadevi. (2016). Ambika Shanmugam's Fundamentals of Biochemistry for Medical Students. (8 ed.). India: Wolter Kluwer.
3. Deb, A.C. (1999), Fundamentals of Biochemistry, New Central Book Agency (P) Ltd., Calcutta
4. Bender, D., Rodwell, V. W., Botham, K. M., Weil, P. A., Kennelly, P. J. (2018). Harper's Illustrated Biochemistry. (31st ed.). Thirty-First Edition. United States: McGraw-Hill Education.
5. Fearon, W. R. (2014). An Introduction to Biochemistry. Netherlands: Elsevier Science.
6. Conn, E. E., Stump, P. K., Bruening, G. & Doi,R.H. (2009).Outlines Of Biochemistry. (5th ed.). India: Wiley India Pvt. Limited
7. Satyanarayana, U. (2006). Biochemistry (3rd ed.). Kolkata: Books and Allied (P) Ltd.

Supplementary Readings

1. Nelson, D. L., & Cox, M. M. (2017). Lehninger Principles of Biochemistry (7th ed.). W.H. Freeman.
2. Vasudevan, D. M., S, S., Vaidyanathan, K. (2016). Textbook of Biochemistry for Medical Students. India: Jaypee Brothers, Medical Publishers Pvt. Limited.
3. AmbigaShanmugam (2012) Fundamentals of Biochemist
4. Devlin, T. M. (2011). Textbook of biochemistry: With clinical correlations. Hoboken, NJ: John Wiley & Sons.
5. Satyanarayana,UChakrapani (2008) – Fundamentals of Biochemistry, Books & Allied publishers, Calcutta
6. Rama Rao, A. V. S. S. (2006). A Textbook of Biochemistry. India: UBS Publishers' Distributors Pvt. Limited.
7. Alistair F.Smith, Geoffrey J.Beckkett, Simon W.Walker, Peter W.H.Rae (2005), Clinical Biochemistry, 6th edition, Replika Press pvt Ltd, India.
8. Talwar, G. P., Sri Vatsava, L. N. & Moudgil, K. D. (1989). Text book of Biochemistry and Human Biology. New Delhi, ND: Prentice Hall of India (P) Ltd.

OUTCOME MAPPING

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|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | **2** |  |  |  |  |
| **CO2** |  | **2** |  |  |  |
| **CO3** |  |  | **2** |  |  |
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| SEMESTER: I  PART: IV | 22UENVS 18: ENVIRONMENTAL STUDIES | CREDIT: 2  HOURS: 2 |

COURSE OBJECTIVES

1. To gain knowledge about the importance of environmental sciences and natural resources.
2. To learn the concept, structure and function of ecosystem and the importance of biodiversity.
3. To understand and gain knowledge about environmental pollution and management.
4. To impart knowledge about social issues and human population.
5. To acquire the skills for identifying and solving pollution problem.

UNIT - I: INTRODUCTION TO ENVIRONMENTAL SCIENCES: NATURAL RESOURCES:

Environmental Sciences – Relevance – Significance – Public awareness – Forest resources – Water resources – Mineral resources – Food resources – conflicts over resource sharing - Exploitation - Land use pattern - Environmental impact - fertilizer -PesticideProblems-casestudies.

UNIT - II:ECOSYSTEM, BIODIVERSITY AND ITS CONSERVATION:

Ecosystem – concept – structure and function producers, consumers and decomposers - Food chain - Food web - Ecological pyramids - Energy flow - Forest, Grassland, desert and aquaticeco system.

Biodiversity - Definition - genetic, species and ecosystem diversity - Values and uses ofbiodiversity - biodiversity at global, national (India) and local levels - Hotspots, threatstobiodiversity-conservationofbiodiversity-Insitu &Exsitu.

UNIT - III:ENVIRONMENTALPOLLUTIONANDMANAGEMENT

Environmental Pollution – Causes – Effects and control measures of Air, Water, Marine, soil, solidwaste, Thermal, Nuclear pollution and Disaster Management - Floods, Earth quake, Cyclone and Land slides.Role of individuals in prevention ofpollution-pollutioncasestudies.

UNIT - IV:SOCIALISSUES-HUMANPOPULATION

Urban issues - Energy - water conservation - Environmental Ethics - Global warming -Resettlement and Rehabilitation issues - Environmental legislations - Environmentalproduction Act. 1986 - Air, Water, Wildlife and forest conservation Act – Population growth and Explosion – Human rights and Value Education – Environmental Health- HIV/AIDS – Role of IT in Environment and Human Health – Women and child welfare – Public awareness – Case studies.

UNIT-V:FIELDWORK

Visittoalocalarea/localpollutedsite/localsimpleecosystem-Reportsubmission

COURSE OUTCOMES

After completion of this course, students will be able to gain knowledge in

1. The scope and importance of environmental science and natural resources.
2. The structure and functions of Ecosystem and biodiversity and its conservation.
3. The problem of environmental pollution and its management.
4. The social issues and human population.
5. They will identify and solve the pollution problem.

Text Books

1. Agarwal,K.C. (2008). *EnvironmentalBiology*, NidiPubl.Ltd.Bikaner.
2. Bharucha Erach, (2004). *Textbook for Environmental Studies,* UGC.
3. Odum, E.P., Odum, H.T. & Andrews, J. (1971). *Fundamentals of Ecology*. Philadelphia: Saunders.
4. Brusseau, M.L., Pepper, I.L., and Gerba, C. (2019). *Environmental and Pollution Science*. Academic Press, USA.
5. Primack R.B. (2014). *Essentials of Conservation Biology*, Oxford University Press, USA.
6. Raven, P.H, Hassenzahl, D.M., Hager M.C, Gift N.Y, and Berg L.R. (2015). *Environment*, (9th Ed.), Wiley Publishing, USA.
7. Rosencranz, A., Divan, S., and Noble M.L. 2002. Environmental Law and Policy in India: Cases, Material & Statutes. Oxford University Press.
8. Schmidtz, D., Shahar, D.C. 2018. Environmental Ethics: What Really Matters, What Really Works 3rd Edition, Oxford University Press, USA.
9. Sengupta,R.(Ed.) 2013. Ecological Limits and Economic Development. Oxford University Press, New Delhi, India.
10. Singh, J.S., Singh, S.P. and Gupta, S.R. 2017. Ecology, Environmental Science and Conservation. S. Chand Publishing, New Delhi.
11. Stuetz R.M., and Stephenson T. (Eds.) (2009). *Principles of Water and Wastewater Treatment Processes (Water and Wastewater Process Technologies).* IWA Publishing, London, UK.
12. Sodhi, N.S., Gibson, L. and Raven, P.H. (Eds). (2013). *Conservation Biology: Voices from the Tropic*s. John Wiley & Sons.
13. Thapar, V. (1998). *Land of the Tiger: A Natural History of the Indian Subcontinent*. University of California Press, USA.
14. Warren, C.E. (1971). *Biology and Water Pollution Control*. WB Saunders.
15. Wilson, E.O. (2006). *The Creation: An Appeal to Save Life on Earth*. W.W. Norton & Company, NewYork, USA.
16. World Commission on Environment and Development. (1987). *Our Common Future*. Oxford University Press, USA.

Supplementary Readings

1. Kumarasamy,K.,A. Alagappa Moses and M.Vasanthy, (2004). *Environmental Studies*, Bharathidsan University Pub,1, Trichy.
2. Rajamannar, (2004). *Environemntal Studies*, EVR College Pub, Trichy.
3. Kalavathy,S. (ED.) (2004). *Environmental Studies*, Bishop Heber College Pub., Trichy.

OUTCOME MAPPING

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| CO/PO | PO1 | PO2 | PO3 | PO4 | PO5 |
| CO1 | 3 | 3 | 3 | 3 | 3 |
| CO2 | 3 | 2 | 3 | 3 | 3 |
| CO3 | 2 | 3 | 3 | 2 | 3 |
| CO4 | 3 | 3 | 3 | 3 | 3 |
| CO5 | 3 | 3 | 2 | 3 | 3 |

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| **SEMESTER: II**  **PART:III** | **22UNFDC23: HUMAN NUTRITION** | **CREDIT:4**  **HOURS/WEEK 4** |

**COURSE OBJECTIVES**

1. Impart the concept of health and nutrition.
2. Learn about macro and micro nutrients.
3. Recognize the various communicable and non-communicable diseases.
4. Recommend the nutrition management process in disease condition.

**Unit I: Bsic concept of health:**

Definition, the importance of health, malnutrition: undernutrition, overnutrition, factors associated with malnutrition: prevalence, dietary recommendations, RDA- ICMR.

Functions of food: food groups, classification of food groups. Interaction between food and health: Role of food in health promotion.

**Unit II: Macronutrients**

Nutrients: definition, classification, macronutrients: Carbohydrates: functions, requirements, food sources, deficiencies, and recommended intake.

Proteins: functions, requirements, food sources, deficiencies, and recommended intake.

Fats: functions, requirements, food sources, deficiencies, and recommended intake.

**Unit III: Micronutrients Vitamins and minerals:**

Fat-soluble vitamins: functions, requirements, food sources, deficiencies and recommended intake. Water-soluble vitamins: functions, requirements, food sources, deficiencies, and recommended intake.

Macro minerals: functions, requirements, food sources, deficiencies, and recommended intake. Micro minerals: functions, requirements, food sources, deficiencies, and recommended intake.

**Unit IV: Life cycle nutrition:**

Nutritional needs, nutritional deficiencies, RDA and dietary measures. Infancy, Pre-school, School going, Pregnancy, Lactation, Adulthood and old age

**Unit V: Communicable and Non-Communicable diseases**

Communicable and non-communicable diseases: causes, symptoms, risk factors, consequences, dietary management. Prevalence, Source of infection, Vaccination schedule, Preventive measures. Communicable diseases: Typhoid, tuberculosis, cholera, chicken box, hepatitis, SARS, and covid-19. Non-communicable diseases: Hypertension, CVD, cancer, renal disorders, liver disorders.

**COURSE OUTCOMES**

On successful completion of the course, the learners should be able to outline the concept of nutrition, nutritional status, role of nutrients in human body.

1. Explain the factors affecting nutrition, sources and deficiency of various nutrients.
2. Identify the methods of determining energy value of foods and the role of various nutrients in human health.
3. Analyze the classifications, functions, digestion, and absorption of various nutrients.
4. Interpret the role of micro and macro nutrients in human health.
5. Explain different types of communicable and non-communicable diseases.

**Text Books**

1. Srilakshmi B. (2011). Dietetics, sixth edition, New age Publishing Press, New Delhi,
2. Stacy N, (2005). William’s Basic Nutrition and Diet Therapy, 12th edition, Elsevier publications, UK.
3. Gopalan C., and Vijayaragavan K., (1971). Nutrition, Atlas of India ICMR, New Delhi.
4. Krause M.V., and Mahan, (1984). Food, Nutrition and Diet Therapy E.B., Saunders Co., Philadelphia, VII edition.
5. Swaminathan M., (2009). The Advanced Text Book on Food and Nutrition, Vol.2., The Bangalore printing and publishing co-limited, Bangalore.

**Supplementary Readings**

1. Barasi, Mary. (2003) Human nutrition: a health perspective. CRC Press,
2. Roday S. (2007). Food Science and Nutrition, Oxford university press, New Delhi,2007
3. Mahan LK, Stump SE, and Raymond JL, (2012). Krause’s Food and Nutrition Care Process, 13th Edition, Elsevier Saunders, Missouri.
4. Robinson CH.(2010).Normal and Therapeutic nutrition, Oxford and IBH publishing company, Bombay.

**OUTCOME MAPPING**

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|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | **3** |  |  |  |  |
| **CO2** |  | **2** |  |  |  |
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| **SEMESTER: II**  **PART:III** | **22UNFDC24: HUMAN PHYSIOLOGY PRACTICAL** | **CREDIT:3**  **HOURS/WEEK 3** |

**UNIT I: CELL-TISSUES**

Microscopic study of Tissues-Epithelial, connective, muscular and nervous tissue.

**UNIT II: BLOOD, HEART AND CIRCULATION**

1. Determination of blood count.
2. Determination of Blood Grouping.
3. Determination of heart rate and pulse rate
4. Recording of blood pressure
5. Estimation of hemoglobin content
6. Determination of blood group

**UNIT III: RESPIRATORYANDNERVOUSSYSTEM**

1. Structure of Lung and brain
2. Microscopic study of muscular and nervous tissue

**UNIT IV: DIGESTIVESYSTEM&EXCRETORYSYSTEM**

Structure of Liver, Pancreas, Stomach, kidney

**UNIT V: ENDOCRINE AND REPRODUCTIVE SYSTEM**

1. Endocrine Glands–Thyroid, Pituitary, Adrenal and Pancreas.
2. Structure of Ovary and Testis

**COURSE OUTCOMES**

Upon successful completion, students will have the knowledge and skills to:

1. Describe the structure of major human organs and explain their role in the maintenance of healthy individuals.
2. Explain the interplay between different organ systems and how organs and cells interaction
3. To maintain biological equilibrium in the face of a variable and changing environment.
4. Interpret and draw inferences from experimental measures of physiological function including electrocardiograms and spirometer read-outs.
5. Apply experimental design skills to understanding population responses and interpreting quantitative data

**Text Books**

**Supplementary Readings**

1. Waugh A and Grant A. (2012) Ross and Wilson Anatomy and Physiology in Health and Illness. 11th ed. Churchill and Livingston, Elsevier
2. Vander, A. J., Sherman, J. H. and Luciano, D. S. (1994) Human PhysiologytheMechanisms of Body Functions. 2nd ed. TMH Publishing Co.,Ltd., Boston.
3. Creager, J. G. (1992). Human Anatomy and Physiology. 2nd ed. WMC BrownPublishers, England.

OUTCOME MAPPING

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|  | PO1 | PO2 | PO3 | PO4 | PO5 |
| CO1 | 2 |  |  |  |  |
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| SEMESTER: II  PART:III | 22unfda02: FOOD PRODUCT DEVELOPMENT and marketing | CREDIT:4  HOURS/WEEK:3 |

COURSE OBJECTIVES

To enable the students to

1. Develop new marketable, nutritionally and economically viable food products.
2. Create entrepreneurship skills for setting up small scale food industries.
3. Understand packaging of different food products.
4. Analyze financial management and marketing food products.
5. Knowledge about standardization of food product.

UNIT I: Trends in Food Consumption pattern

Economical, Psychological and Sociological Dimensions of Food Consumption patterns. Trends in Social Change as a Base for New Product Development.

UNIT II: Food Components

Types of Food Processing, Status of Food Processing Industry in India and Scope of Growth in Future, Principles and Purpose of New Product Development, Product Design and Specifications.

UNIT III: Traditional Foods

Weaning Foods, Convenience Foods, RTE, RTS, Extruded foods, IMF Foods, Specialty Products, Health foods, Nutritional Supplements, Functional Foods, Nutraceuticals and Designer Foods, Sports Foods, Foods for Defence Services, Space foods.

UNIT IV: Standardization

Portion size, Portion Control, Quantity Cooking, Shelf Life Evaluation- Sensory and Microbial Testing of Processed Foods, Nutrient Analysis. Suitable Packaging Materials for Different Foods, SWOT Analysis

UNIT V: Institutional Support (Training and Finance) for Entrepreneurship Development

Financial Institutions (Central and State Government) banks/Funding Agencies, Financial Accounting Procedures, Book Keeping, Market Research, Marketing Strategies,Cost Calculation , Advertising Methods, Product sales, Product License, Legal specifications, Consumer Behaviour and Food Acceptance.

COURSE OUTCOME

1. Apply the principles of quality assurance, and food safety to a food product design
2. Gain skills to develop a new food product
3. Produce elements of HACCP-based food safety program that is applicable to the production of a new food product
4. Work collaboratively with others on a major investigative project
5. Develop skills in entreprenial management.

Text Books

1. Sudhir Gupta (2007) Handbook of Packaging Technology, Engineers India Research Institute, New Delhi.
2. Khanaka, S.S., Entrepreneurial Development, S. Chand and Company Ltd, New Delhi, 2006.
3. Suja, R. Nair(2004) Consumer Behaviour and Marketing Research, 1st Edition, Himalaya Publishers.

Supplementary Readings

1. Hmacfie, (2007) Consumer led Food Product Development, Weed head Publishing Ltd., UK
2. Fuller, Gordon, W ( 2005) New Food Product Development, 2nd Edition, CRC Press, Boca Raton, Florida.
3. Schaffner. D,J, Schroder , W.R. (2000) Food Marketing and International Perspectives, eb/McGraw Hill Publication.

OUTCOME MAPPING

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|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | **2** |  |  |  |  |
| **CO2** |  | **3** |  |  |  |
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| SEMESTER: I  PART: III  PRACTICAI: I | 22UNBCP01:NUTRITIONAL BIOCHEMISTRY PRACTICAL | CREDIT: 3  HOURS/WEEK :3 |

COURSE OBJECTIVES

1. Demonstrate practical skills necessary to conduct laboratory based tests
2. Understand the reactions of nutrients through qualitative experiments
3. Get training on quantitative analysis of various biochemical parameters in body fluids
4. Describe selected and relevant biochemical techniques
5. Knowledge on different types of estimation.

Practical

1. Quantitative analysis of biochemical parameters in body fluids – blood, serum and urine
2. Qualitative tests for carbohydrate – glucose, fructose, lactose, maltose and unknown sugar
3. Quantitative tests for sugar profile – total sugar, reducing and non-reducing sugar
4. Qualitative tests for proteins – albumin, casein and gelatin
5. Qualitative tests for amino acids – tyrosine, cysteine, methionine, tryptophan
6. Quantitative tests for polysaccharides – starch and fbre

Experiments

1. Estimation of urinary creatinine
2. Estimation of urinary urea - diacetyl monoxime method.
3. Estimation of serum protein - Biuret method.
4. Estimation of iron and heaemoglobin
5. Estimation of glucose - 4Orthotoluidine method
6. Reactions of glucose
7. Reactions of fructose
8. Reactions of galactose
9. Reactions of maltose
10. Reactions of lactose
11. Reactions of sucrose
12. Analysis of unknown sugar
13. Estimation of total sugar
14. Estimation of starch and fibre
15. Estimation of amino acids
16. Visit to laboratory
17. Final practical examination

COURSE OUTCOMES

1. Acquire skills in qualitative tests and quantitative estimation of nutrients
2. Quantitatively analyse the biochemical parameters in blood, serum and urine samples
3. Qualitatively identify the presence of macronutrients
4. Demonstrate the various analytical techniques
5. Empower knowledge on different methods of eswtimation.

Text Books

1. Sharma DC, Devanshi Sharma (2017), Nutritional Biochemistry, CBS Publishers & Distributors.
2. Ramadevi. (2016). Ambika Shanmugam's Fundamentals of Biochemistry for Medical Students. (8 ed.). India: Wolter Kluwer.
3. Deb, A.C. (1999), Fundamentals of Biochemistry, New Central Book Agency (P) Ltd., Calcutta
4. Bender, D., Rodwell, V. W., Botham, K. M., Weil, P. A., Kennelly, P. J. (2018). Harper's Illustrated Biochemistry. (31st ed.). Thirty-First Edition. United States: McGraw-Hill Education.
5. Fearon, W. R. (2014). An Introduction to Biochemistry. Netherlands: Elsevier Science.
6. Conn, E. E., Stump, P. K., Bruening, G. & Doi,R.H. (2009).Outlines Of Biochemistry. (5th ed.). India: Wiley India Pvt. Limited
7. Satyanarayana, U. (2006). Biochemistry (3rd ed.). Kolkata: Books and Allied (P) Ltd.

Supplementary Readings

1. Nelson, D. L., & Cox, M. M. (2017). Lehninger Principles of Biochemistry (7th ed.). W.H. Freeman.
2. Vasudevan, D. M., S, S., Vaidyanathan, K. (2016). Textbook of Biochemistry for Medical Students. India: Jaypee Brothers, Medical Publishers Pvt. Limited.
3. AmbigaShanmugam (2012) Fundamentals of Biochemist
4. Devlin, T. M. (2011). Textbook of biochemistry: With clinical correlations. Hoboken, NJ: John Wiley & Sons.
5. Satyanarayana,UChakrapani (2008) – Fundamentals of Biochemistry, Books & Allied publishers, Calcutta
6. Rama Rao, A. V. S. S. (2006). A Textbook of Biochemistry. India: UBS Publishers' Distributors Pvt. Limited.
7. Alistair F.Smith, Geoffrey J.Beckkett, Simon W.Walker, Peter W.H.Rae (2005), Clinical Biochemistry, 6th edition, Replika Press pvt Ltd, India.
8. Talwar, G. P., Sri Vatsava, L. N. & Moudgil, K. D. (1989). Text book of Biochemistry and Human Biology. New Delhi, ND: Prentice Hall of India (P) Ltd.

OUTCOME MAPPING

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|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
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| **SEMESTER: II**  **PART:** | **22UNFDE26-1: SPORTS NUTRITION** | **CREDIT:3**  **HOURS/WEEK 3** |

**COURSE OBJECTIVES**

1. To acquaint students with the structure, function and interaction of nutrients and the concept of energy to maintain optimal health and fitness.
2. Describe specific adaptations, advantages and precautions of various modes of training for physically active individual across the lifespan (e.g., pediatric to geriatric) and people with special needs
3. To gain understanding of the various supplements and drugs used in sports and the nodal bodies for controlling doping.
4. To understand the physiological adaptation and metabolic changes during exercise at varying intensities.

**Unit I: Introduction to sports nutrition-**

Diet and exercise for lifelong fitness and health, Energy systems and exercise, Role of Carbohydrates, Proteins, Fats and Minerals in Nutrition, Fluids and electrolytes, Body Composition.

**Unit II: Exercise issue related to adults, geriatric and women’s -**

Risks of Exercise in adolescents and elderly-Need and Importance of Exercise in Healthy Elderly –Strength training for children/ older adults and women - Strength Training for children - Strength training for older adults, Limitations faced by female population on doing physical activities- Pregnancy Strength training for females - Weight Training Guidelines for Pregnant women.

**Unit III: Athletes with nutritional related disorders-**

Diabetes, Cardiovascular disease, Osteoporosis, Sports anemia-Definition and description; Causes and consequences; Physiological effects of exercise; Pathophysiology; Medical Nutrition Therapy**.** Pre and post event carbohydrate loading and fluids, Insulin adjustments for athletes with type-1 diabete

**Unit IV: Dietary supplements-Definition and classifications;**

Ergogenic aids: Definitions and Classifications. World anti-doping agency and National Anti-doping agency (NADA), Formation, History and Standards; List of prohibited substances and Drugs. CHO Supplements: Carbo loading, Sports Drinks, Bars and Gels.

**Unit V: Exercise Physiology-**

Definitions of terminologies (Work, Power, speed, strength, efficiency etc.) Types of exercise (aerobic and anaerobic) and limiting factors, Exercise intensity and duration. Physiological and metabolic adaptations to training; Muscle hypertrophy and performance, Endurance versus resistance training and performance, Training adaptations and maladaptation and detraining.

**COURSE OUTCOMES**

1. Understands the exercise issues related to Adolescence, Older adults and Females.
2. Understand the nutritional requirements for Special groups and Dietary needs.
3. Understand the evolution of ergogenic aids or drugs among athletes and government regulations.
4. Understand the basics of Exercise Physiology.
5. Understand the Skeletal muscle and neuromuscular system

**Text Books**

1. Dianne S. Ward, Ruth P. Saunders, Russell R. Pate, Physical Activity Interventions in Children and Adolescents, Human Kinetics Publishers.
2. Burke, Louise, and Vicki Deakin. (2015). Clinical sports nutrition. McGraw-Hill.
3. Antonio, J., & Stout, J. R. (2002). Supplements for endurance athletes. Human Kinetics.
4. Raven, P., Wasserman, D., Squires, W., & Murray, T. (2012). Exercise Physiology: An Integrated approach. Nelson Education.

**Supplementary Readings**

1. Deepak Jain , Physical and Drill Training for Children, Human Kinetics Publishers.
2. Marie Dunford. (2017) Nutrition for Sport andExercise.
3. Cooper, C. E. (2008). Drugs and ergogenic aids to improve sport performance. Essays in biochemistry, 44,1-10.
4. Farrell, P. A., Joyner, M., &Caiozzo, V. (2011). ACSM's advanced exercise physiology.

**OUTCOME MAPPING**

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|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
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| **SEMESTER: II**  **PART:III** | **22UNFDE26-2: WOMEN’S HEALTH NUTRITION** | **CREDIT:3**  **HOURS/WEEK 3** |

**COURSE OBJECTIVES**

1. This Course will include an analysis of health issues which concern women throughout the life cycle.
2. It will create awareness about the importance of Nutrition and Health to improve the quality of life for women in particular.
3. To understand the functions and role of nutrients, their requirements and the effect of deficiency and excess.

**Unit I: Women’s Health and sexuality**

Socio-cultural and economic determinants of Women’s Health and sexuality. Female Anatomy- Reproductive organs.

**Unit II: Reproductive Health**

Concept – Definition, Menarche, Menstruation, pregnancy, child birth, pre-menstrual syndrome and menstrual disorder. Pregnancy- Ailment related to pregnancy; Anemia, Unwanted pregnancy – sex determination tests & termination of pregnancy; abortion, MTP Act, delivery, Menopause. genitor-urinary tract infection, AIDS, STD, impact on women. Adoption of Family Planning a gender dimension.

**Unit III: Importance on Nutrition for adolescent girls and women**

International guidelines on maternal nutrition, Assessment of Nutritional status- Anthropometric indicators, Biochemical indicators and Dietary assessments.

**Unit IV: Nutritional vulnerability of women and adolescent girls**

Vulnerability by type of malnutrition, Factors influencing nutritional vulnerability, Increased nutritional requirements and reduced intakes.

**Unit V: Health-related interventions**

Maternal mental health and psychosocial support, Breastfeeding care and support, Integration of nutrition services within the health system.

**COURSE OUTCOMES**

1. The student will be able to apply basic nutrition knowledge in making foods choices and obtaining an adequate diet.
2. The student will understand the functions and role of macronutrients, their requirements and the effect of deficiency and excess.
3. The student will gain knowledge about energy requirements and the Recommended Dietary Allowances
4. Develop knowledge on integration on nutrition service within the health system
5. Acquire knowledge on role of nutrient in maintaining health and preventing various diseases.

**Text Books**

1. Das Gupta Monica & Krishnan T.N. “Women and Health”. Oxford, New Delhi. (1998).
2. Mohan Rao (Ed). “The Unheard Scream: Reproductive Health and Women’s Rights in India”. Zubaan, New Delhi. (2004).
3. Antia F.P., Philip Abraham, Clinical Dietetics and Nutrition, Oxford University Press; 4th edition.

**Supplementary Readings**

1. Passmore R. and Davidson S. (1986) Human nutrition and Dietitics. Liming stone publishers.

OUTCOME MAPPING

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|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | **2** |  |  |  |  |
| **CO2** |  | **2** |  |  |  |
| **CO3** |  |  | **2** |  |  |
| **CO4** |  |  |  | **3** |  |
| **CO5** |  |  |  |  | **3** |

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| **SEMESTER:II**  **PART:** | **22UNFDE26-3: NUTRACEUTICALS AND NUTRIGENOMICS** | **CREDIT: 3**  **HOURS/WEEK 3** |

**COURSE OBJECTIVES**

1. Learn to define Nutraceuticals and nutrigenomics.
2. Understand the role of dietary supplements and nutraceuticals in health and disease.
3. Knowledge to classify the probiotics and prebiotics.
4. Acquire knowledge for the application of nutrigenomics in health and disease.

**Unit I: Definition and history**

Definition of functional and traditional foods, nutraceuticals, designer foods and pharma foods, history of functional foods, components of functional foods, foods containing nutraceuticals and classification of nutraceuticals - based on plant sources, mechanism of action and chemical nature

**Unit II: Categorization of Nutraceuticals Classification**

Based on food source, mechanism of action and chemicalnature-isoprenoid, phenolic substances, fatty acids and structural lipids,terpenoids – saponins, tocotrienols and simple terpenes, carbohydrates andamino acid based derivatives, isoflavones.

**Unit III: Dietary supplements and role in human**

Concept of dietary supplements, sources and functions .Human gastrointestinal tract and its microbiota, functions, concept of probiotic, prebiotics and symbiotics; applications of probiotics in human nutrition

**Unit IV: Definition of nutrigenomic and Concepts**

Definition of nutrigenomics, gene expression - transcription, translation, post translational modification, nutrition in the omics era- elementary concepts on epigenetics, transcriptomics, proteomics, metabolomics;

**Unit V: Nutrients and Gene expression**

Nutrient control of gene expression - amino acids, nucleotides, basic concepts of nutrigenomics and complex diseases - diabetes, cancer and obesity. Genetic variation and nutritional implications.

**COURSE OUTCOMES**

1. Understand the developments in the field of nutraceuticals and nutrigenomics
2. Comprehend the components of functional foods and foods containing of \ nutraceuticals
3. Know the role of probiotics and prebiotics in human health
4. Promote nutrigenomics in preventing life style disease
5. Gain knowledge on gene expression.

**Text Books**

1. Mahtab, S, Bamji, Kamala Krishnasamy, G.N.V. Brahmam, Text Book of Human Nutrition, Third Edition, Oxford and IBH Publishing Co. P. Ltd., New Delhi, 2009.
2. Srilakshmi, B. Second Edition, Food Science, New Age International (P) Limited Publishers, New Delhi, 2010.
3. Simopoulus, A.P. and Ordovas, K.J.M., 2004, Nutrigenetics and Nutrigenomics, Vol. 93, Karger, Switzerland.

**Supplementary Reading**

1. Watson, David, H., 2003, Performance Functional Foods, CRC Press, Wood Head Publishing Ltd., England
2. Narasinga Rao, B.S., 2005, Nutrition Research in India - A Country Report, Published by INSA, New Delhi.
3. 3.Webb, G.P., 2006, Dietary Supplementations and Functional Foods, Blackwell Publishing Ltd., New York.

**OUTCOME MAPPING**

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|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
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**SEMESTER – III**

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| **SEMESTER:III**  **PART:III** | **22UNFDC33**  **NUTRITIONAL THROUGH LIFE CYCLE** | **CREDIT:4**  **HOURS/ WEEK:4** |

**COURSE OBJECTIVES**

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| 1. Learn the principles of meal planning. 2. Plan meals for the family members at different income levels. 3. Describe the nutritional requirements for different age groups. 4. Plan meals for special groups - infants, preschoolers, adolescents, pregnant & nursing mothers and the aged. 5. Improve the lifestyle through proper diet planning. |

**Unit I: Nutrition in Pregnancy and Lactation**

Stages of gestation, maternal weight gain, complications of pregnancy, nutritional problems and dietary management, the importance of nutrition during and before pregnancy, teenage pregnancy - nutritional problems, and dietary management.

Physiology of lactation, hormonal control, and reflex action, the efficiency of milk production, problems of breastfeeding, the nutritional composition of breast milk, nutritional concerns during lactation, special foods during lactation, dietary modification.

**Unit II: Nutrition during early childhood: Infancy**

Nutritional status of infancy, Growth monitoring, Nutritional allowances, Breast feeding- importance, Weaning Foods, Low birth weight babies and their nutritional care. Breast feeding Vs Bottle feeding

**Pre-school age:** Physiological development related to nutrition, feeding problems, behavioral characteristics, nutritional requirement.

**Unit III: Nutrition during school age and adolescence: School age**

Physical development and nutritional status, Food habits and nutritional requirements.

**Adolescence:** Physiological changes, nutritional need and food habit, Behavioral modification to combat malnutrition. Factors affecting food choices Nutritional problems among adolescence, eating disorders.

**Unit IV: Nutrition for adult:Adulthood**

definition, stages of adulthood period, early adulthood, middle adulthood, late adulthood, nutritional needs, deficiencies, RDA, Factors influencing Nutritional requirements based on physical activity.

**Unit V: Nutrition for Elderly**

The aging process - Physiological, biochemical, and body composition changes. - Socio-psychological aspects of ageing - Special problems of the elderly. - Nutritional requirements of the elderly & dietary management to meet nutritional needs.

**COURSE OUTCOMES**

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

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| 1. Physiological changes and hormones involved during pregnancy and lactation. |
| 1. Plan a healthy food choice for physical, physiological, psychological aspects in infancy. 2. The students will be able to relate nutrient needs to developmental stages and plan diets which will adequately meet nutritional needs during childhood. 3. The student will learn the impact of growth and development in arriving at the nutritional needs of adolescents. 4. Determine nutrient requirements during old age. |

**Text Books**

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| 1. Srilakshmi. (2017), dietetics, New Age publishers, New Delhi. 2. Stacy N, William’s (2005). Basic Nutrition and Diet Therapy, 12th edition, Elsevier publications, UK. 3. Whitney EN and Rolfes SR,(2002).Understanding Nutrition, 9 th edition, West/Wordsworth.2002 |

**Supplementary Readings**

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| --- |
| 1. Williams SR (2000). Nutrition and Diet Therapy, Sixth Edition C.V. Melskey Co, (2000). 2. Kango M 9(2005). Normal Nutrition, Curing diseases through diet, First Edition CBS Publications. 3. Paul S ,(2003). Text Book of Bio-Nutrition, Fundamental and Management, RBSA Publishers. 4. Judith E. Brown(2009) Nutrition through the life cycle Fith Edition,CENGAGE Learning, US. 5. Swaminathan M (2017), Food and Nutrition, Second Edition. |
| **Outcomes Mapping**   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | | **CO1** | **2** |  |  |  |  | | **CO2** |  | **2** |  |  |  | | **CO3** |  |  | **2** |  |  | | **CO4** |  |  |  | **2** |  | | **CO5** |  |  |  |  | **2** | |

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| |  |  |  | | --- | --- | --- | | **SEMESTER: III**  **PART:III** | **COURSE CODE: 22UNFDP34**  **HUMAN NUTRITION PRACTICALS** | **CREDIT: 0**  **HOURS/WEK:3** |   **COURSE OBJECTIVES**  To enable the students to   1. Describe role of food in human nutrition 2. Determine the Energy requirement by various age groups. 3. Understand the effect of lipid on health status. 4. Classify the protein based on the quality. 5. Describe the Role of vitamins and minerals.   **HUMAN NUTRITIONPRACTICALS**   1. Quantitative estimation of reducing sugar by Benedict’s method 2. Quantitative estimation of calcium 3. Quantitative estimation of phosphorous. 4. Quantitative estimation of vitamin C. 5. Demonstration Experiments. 6. Estimation of total nitrogen in foods (Micro or Macro kjeldahl method) 7. Lipid extraction 8. Demonstration of Iodine value 9. Estimation of Iron   **COURSE OUTCOMES**   1. Gain knowledge on various nutrient analysis of foods 2. Understand the estimation of sugars and nitrogen 3. Understand the techniques of estimation of lipids 4. Gain knowledge on qualitative and quantitative analysis on nutrients present in the given solution. 5. Gain knowledge on estimation of calcium and iron   **Text Books**   1. Shubhangini. A. Joshi; Nutrition and Dietetics III edition, 2. McGraw Hill Education (India) private limited ,2015. 3. Srilakshmi.B; Nutrition Science, 15th edition, New Age International (P) Limited, 4. Publishers, 2016. 5. Swaminathan. M; Advanced Text-Book on Food and Nutrition, Volume I 2nd edition. 6. The Bangalore Printing and Publishing Co., LTD, Reprint 2015. 7. MahtabS.Bamji,PrasadRao,N.VinodiniReddy;TextbookofHumanNutrition,Second 8. Edition Oxford and IBH Publishing Co. Pvt .Ltd, 2003. 9. Judith E. Brown., Nutrition Now, 2nd edition, West / Wadswroth west / 10. Wadsworth,An International Thomson publishing company, 1998.   **Supplementary Readings**   1. SunetraRoday; Food Science and Nutrition, 2nd edition, Oxford University Press,2013 2. Carol Byrd - Bredbenner; Wardlaw’sperspecctives in Nutrition, 9th edition MCGrawHill International Edition 2013 3. Gordon.M.Wardlawet.al; Contemporary Nutrition,2nd edition,Publishingby Mosby, 2004. 4. William’s; Nix; Basic Nutirtion and Diet therapy, 14th edition, Publishing by Mosby, 2013. 5. Srilakshmi.B;Dietetics,7thedition,NewAgeInternational(P)LimitedPublishers, 2014. 6. Varley, H., Gowenlak, A.H. and Hill, M. Practical Clinical Biochemistry, William Itinmaon Medical Books, London, 2000. 7. Oser, B.L., Harke’s Physiological Chemistry XIV Edition Tata McGraw Hill Publishing Company Ltd., Bombay, 2001 8. Sadasivam, S. and Manickam, A. Biochemical Method, Second Edition,New Age International P. Ltd., Publishers, New Delhi, 2003. 9. Raghuramulu, N., Madhavannair, K. and KalyanaSundaram, National Institute of Nutrition, 2013, A Manual of Laboratory Techniques, Hyderabad, 50000   **Outcomes Mapping**   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | | **CO1** | **2** |  |  |  |  | | **CO2** |  | **2** |  |  |  | | **CO3** |  |  | **2** |  |  | | **CO4** |  |  |  | **2** |  | | **CO5** |  |  |  |  | **2** | |

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| |  |  |  | | --- | --- | --- | | SEMESTER: III  PART:III | 22UNEEA03: EXTENSION EDUCATION | CREDIT:4  HOURS/ WEEK:4 |   **COURSE OBJECTIVES**  The learners will be able to,   1. Understand concept and principles off extension education 2. Acquire comprehensive knowledge on historical review of extension education 3. Acquire knowledge community development programmes 4. Develop skills to organize community development programmes 5. Knowledge about different programmes   UNIT- I  **Concept of Extension Education:** Meaning, objectives and principles of Extension Education and Home Science Extension Education; Role of home science in developing a community. Historical review of extension education in India and abroad; Role and qualities of an Extension worker; Role and Functions of Extension Educator; Qualities of extension educator; Role of Home Science in National Development.  UNIT-II  **Community Development and Panchayat Raj:** Meaning, Principles, Objectives, Scope and Philosophy of community development in India. Historical review of community development in India; Evolution of Panchayat Raj set up and functions at the central, state, District, Block and village level, Three tier system and the principle of Democratic decentralization; Problems of the community development and Panchayat Raj; Similarities and Dissimilarities between community Development and extension education.  UNIT- III  **Community Participation:** Meaning, Importance, Factors influencing community participation, measures to improve community participation. Recent extension approaches: Participatory Rural Appraisal (PRA), Action plays, child-to-child approach,Woman-to-Woman approach, Rapid Rural Appraisal (RRA).  UNIT- IV  **Communication** - concept, Forms of communication- verbal and non verbal - Meaning and significance, Communication Aids : Audio visual aids in extension work – Conventional aid - motion pictures, slides, flannel graphs, flash cards, graphs, puppet shows and Mass media.  Unit - V  **Program planning** - Meaning and importance, Principles of programme planning, steps involved in programme planning. Evaluation: Meaning and types of evaluation. Five year plans and Social Welfare Programmes: National and International agencies for the development and welfare of women and children – UNICEF, CARE, WHO, IRDP, ANP, ICDS, TRYSEM, DWCRA and NAEP.  **COURSE OUTCOME**:  The learners will be able to,   1. Understand the role of extension workers in planning programmes for the community. 2. Obtain necessary skills in extension teaching and field work 3. Gain knowledge on communication skill 4. Understand the role of national and international agencies in the community development. 5. Develop innovative methods for the community participation for the national development   Textbooks   1. Addivi Reddy. (1987). Extension Education. Sree lakshmi press, Andrapradesh. Bhattacharya, S.A. (1970). Community Development - An analysis of the Programme in India', Academic Publishers, Calcutta,. 2. Bhattacharya, S.N. (1983). Rural Development in India and other Developing Countries', New Delhi : Metropolitan Publishers. 3. Dahama O.P. and Bhat Nagar.O.P. (1985). Extension and Communication for Development, New Delhi : Oxford and IBH Publishing Company. 4. Desai, A.R, (1994). Rural Sociology in India. Popular Prakasham publishers. Extension Education in Community Development (1961), Directorate of 5. Extension, Ministry of Food and Agriculture, Govt. of India, New Delhi,. NIRD (1991). Rural development Statistics. Rajendra Nagar, Hyderabad.   Supplementary Readings   1. Patnayak Rama, (1990). Rural Development in India, New Delhi : Vikas Publishing House Pvt. Ltd., 2. Ray G.L. (1991). Extension Communication and Management, Calcutta : Naya Prakash. 3. Reddy, A., (2006): Extension Education, Sree Lakshmi Press, Bapatla, A.P. Sharma, S.K and Malhotra, S.L. (1977). Integrated Rural Development, New Delhi : Abhinar Publications. 4. Shelat, K.N. (1988). Evalution of Rural Development, Ahamedabad : Kathan Education Communication Unit, Manekbarag. 5. Supe, S.V., (1994): An Introduction to Extension Education, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | | **CO1** | **3** |  |  |  |  | | **CO2** |  | **2** |  |  |  | | **CO3** |  |  | **2** |  |  | | **CO4** |  |  |  | **2** |  | | **CO5** |  |  |  |  | **3** |  |  |  |  | | --- | --- | --- | | **SEMESTER:III**  **PART: III** | **22UNFDE36-1: COMPUTER APPLICATIONS IN RESEARCH** | **CREDIT: 3**  **HOURS /WEEK:3** |   **COURSE OBJECTIVES**   1. To acquaint students with current trends in medical informatics as they apply to the healthcare field. 2. To help students to grow in their awareness of the ways in which information technology is used in practical and work-related situations. 3. To enable students to explore computer applications in health education, practice, administration and research.   **Unit I: Computer Basics**  Preparing slides in using MS-POWERPOINT, Introduction to Internet – Using search engine – Google search – Exploring the next using Internet Explorer and Navigator – Uploading and Download of files and images – E-mail ID creation – Sending messages – Attaching files in E-mail  **Unit II: Health Information Retrieval and Digital Libraries**  Indexing and abstracting services, Factual databases, Information retrieval, Knowledge-based information, Evaluation  The Internet (advanced usage) - E-mail, Mailing lists, Newsgroups, Health-related discussion forums, Telemedicine, E-health, Telepharmacy, Medical resources on the Internet  Health websites: PubMed & Medscape, Literature search strategies  Uses of computer applications within hospitals and the healthcare system  **Unit III: Documentation**  Processing of data – Tabulation& Graphical representation of data, guidelines for writing references and bibliographical citation- APA, MLA, Chicago, Harvard style, Use of software in writing references and bibliographical citation, Plagiarism-code of ethics and Application of plagiarism software (in brief).  **Unit IV: DATA ANALYSIS**  Data Analysis using MS Excel. Simple statistical analysis using Excel, making graphs and charts.  **Unit V: Computer and mobile applications**  Learning the application of software and mobile apps in the field of nutrition, food service management and dietetics.  **COURSE OUTCOMES**  The learners will be able to   1. Execute the digital learning of computers in the field. 2. Know to analyse and document the data. 3. Gain knowledge on search engine 4. Inculcate comprehensive knowledge on computer in the field of Nutrition 5. Apply gained knowledge computer in the field of Dietetics   **Text Books**   1. Best, JW and Kahn, JV (1992) Research in Education.6th ed. New Delhi, Prentice Hall of India Pvt. Ltd,. 2. Kothari, CR (2004) Research Methodology, Methods & Techniques, 2nd ed. New Age International Publishers. 3. Goode, WJ and Hatt, PK (1981) Methods in Social Research, McGraw Hill International Editions, Sociology Series.   **SUPPLEMENTARY READING**   1. Kerlinger, FN (1983) Foundations of Educational Research. 2nd ed. 2. Marjory L. Joseph, William D Joseph (1996) Research Fundamentals in Home Economics Human Ecology. Plycon Press. WHO (2001) Health Research Methodology – A Guide for Training in Research Methods.   **Outcomes Mapping**   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | | **CO1** | **2** |  |  |  |  | | **CO2** |  | **2** |  |  |  | | **CO3** |  |  | **2** |  |  | | **CO4** |  |  |  | **3** |  | | **CO5** |  |  |  |  | **3** |  |  |  |  | | --- | --- | --- | | **SEMESTER:III**  **PART:III** | **22UNFDE36-2: HOUSE KEEPING** | **CREDIT:3**  **HOURS /WEEK:3** |   **COURSE OBJECTIVE**   1. To train personnel to be effective at their job of cleaning, regulation and maintenance. 2. To enhance the skills in customer service to being detail oriented. 3. Train to ensure hospitality, cleanliness and discipline inside the hotel. 4. Improve skills of preserving and protecting of buildings assets.   **UNIT 1:**   1. Objective and introduction to housekeeping and it’s role 2. Development of hotel industry in India. 3. Category and types of accommodation : based on user, property type, duration, rating, geographical location, size, physical characteristics and structure of hotel 4. Housekeeping functions 5. Safety and security: key, key thefts, valuable and other safety measures. 6. Maintains inventories   **UNIT 2**   1. Attributes of housekeeping: Pleasant personality, physical fitness, grooming and personal hygiene, Basic etiquettes, eye for details, oderliness, and others 2. Qualities of housekeeping: Relational, multilingual, service oriented and other orientations.   **UNIT 3**   1. Hotel organization: need of an organizational structure, layout is housekeeping, job description, job specification and organization based on size . 2. Duties and responsibilities of housekeeping personnel.   **UNIT 4**   1. Objectives and introduction, Layout and size of linen room- Responsibilities of linen room-Linen room equipment, Linen good hire. Linen par- stock rooms, Linen control 2. Functions of uniform room   **UNIT 5**   1. Laundry store and room supply, Types of laundry, Planning an OPL, Layout of an OPL, Steps follow in guest laundry, Laundry equipment, Characteristics of laundry fabric, Cleaning agent used in laundry clothes. Laundry flow chart.   **COURSE OUTCOMES**  The learners will be able to   1. Gain knowledge on –house keeping 2. Acquire knowledge to maintain different inventions 3. Develop measures to evaluate the qualities of house keeping 4. Ensure the duties and responsibilities of housekeeping personal 5. Apply the knowledge on laundry needed situation   **Text Books**   1. Hotel housekeeping, operation and management – G Ranghubalan and Smrittee Raghubalan 2. Complete Household Handbook: The Best Ways to Clean, Maintain & Organize Your Home.   **Outcomes Mapping**   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | | **CO1** | **2** |  |  |  |  | | **CO2** |  | **2** |  |  |  | | **CO3** |  |  | **2** |  |  | | **CO4** |  |  |  | **2** |  | | **CO5** |  |  |  |  | **2** |  |  |  |  | | --- | --- | --- | | **SEMESTER: III**  **PART: III** | **22UNFDE36-3: FAMILY DYNAMICS** | **CREDIT: 3**  **HOURS /WEEK: 3** |   **COURSE OBJECTIVE**   |  | | --- | | To enable the students to:   1. Develop a scientific attitude towards behavioural patterns in individual, family and community life. 2. Understand factors leading to adjustments in marriage. 3. Understand measures to overcome family crisis 4. Gain knowledge over parenthood and child rearing 5. Develop various measures to overcome unemployment status | |  | | **UNIT – I:Introduction to family Dynamics**  Family Dynamics – Meaning, Significance of family dynamics in contemporary society.  **UNIT – II: Marriage**  Meaning, preparation, motives, functions and types of marriage. Personality development in relation to marriage. Physical, mental health, emotional maturity in relation to marriage. Factors affecting marriage relationship – religion, socio economic status, careers. Adjustment in marriage – physiological, domestic, social, in-laws relationship. Role of counselling- Pre marital & marital.  **UNIT – III:Family**  Meaning, family as the basic social institution, significance of family, Types, characteristics of family. The place of the individual, man, woman and child in the family and their roles in society. Parenthood – duties, styles of parenting, child rearing techniques. Small family norm.  **UNIT-IV:Family Crisis**  Meaning, causes, types and consequences – Death, divorce, desertion, suicide, prolonged illness, imprisonment, unemployment, dowry, alcoholism, drug addiction, war separation, economic inflation, economic depression.  **UNIT - V : Dealing With Issues Related To Family Dynamics**  International organizations |   **COURSE OUTCOMES**   1. Understand the family dynamics 2. Recognize the importance of marriage 3. Know the crisis in family and adopt to overcome it 4. Understand role of organisations family dynamics 5. Understand various measures to lead a better life after crisis  |  | | --- | | **Text Books** | | 1. Berk L.E., (2004). Child Development, New Delhi : Pearson Longman. 2. Hurlock, E.B., (1995). Developmental Psychology - A life span approach, 5th Edition, New York : McGraw Hill Book Co. 3. Kakar, Sudhir, (2012). The Inner world: A Psychoanalytical Study of Childhood and Society in India. Oxford University Press, Oxford. 4. Suriakanthi A., (1997): Child Development – An Introduction, Sivakasi: Kavitha Publishers. |   **Supplementary Readings**   1. Madan, T.N. and Majumdas, D.N. (1986). An Introduction to Social Anthropology, National Publishing House. 2. Nanda V.K., (1998): Priniciples of Child Development, New Delhi : Anmol Publications Pvt. Ltd., 3. Rajammal P. Devadas and Jaya N.Muthu,(1996): A Text Book of Child Development, New Delhi : Macmillan Publishing House.  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **Outcomes Mapping** | | | | | | |  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | | **CO1** | **2** |  |  |  |  | | **CO2** |  | **2** |  |  |  | | **CO3** |  |  | **2** |  |  | | **CO4** |  |  |  | **2** |  | | **CO5** |  |  |  |  | **2** | |

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| **SEMESTER: III**  **PART: IV**  **NME: I** | **22UNFDN37: PRINCIPLES OF ECONOMICS** | **CREDIT: 2**  **HOURS: 2/W** |

**Course Objectives**

1. Understanding Nature and Scope of economics
2. Gain knowledge on Demand
3. To help student gain knowledge about Theory of Production

**Unit I: Nature and Scope of Economics**

Nature and Scope of economics: Importance, Subject matter: Science Vs. art, Positive science Vs. normative science, Deductive method Vs. inductive method -Definitions of Economics: Wealth, Welfare, Scarcity and Growth - Different economic systems: merits and demerits - Divisions of Economics - Microeconomics and Macroeconomics - Agricultural Economics: Definition and scope - Basic concepts: Goods, Service, Value, Cost, Price, Wealth and Welfare - Wants: Characteristics and classification.

**Unit II: Theory of Consumption**

Utility: Definition, Measurement: Cardinal and ordinal utility, Marginal utility - Law of Diminishing Marginal Utility and Law of Equi-marginal Utility: Definition, Assumptions, Limitations and Applications - Indifference curve analysis: Definition and properties of indifference curves and budget line - Demand: Definition, Kinds of demand, Demand schedule, Demand curve, Law of Demand, Determinants of demand, Extension and Contraction of demand Vs. Increase and decrease in demand - Elasticity of Demand: Types, Degrees of price elasticity of demand, Factors influencing elasticity of demand, Importance of elasticity of demand – Standard of Living: Definition, Engel’s Law of Family Expenditure - Consumer surplus: Definition and Importance.

**Unit III: Theory of Production**

Concept of production – Factors of production – Land: Characteristics of land -Labour: Characteristics of labour, Division of labour, Malthusian and Modern theories of population – Capital: Characteristics of capital, Capital formation – Entrepreneur: Characteristics and functions of entrepreneur. Supply: definition, Law of Supply, Factors influencing supply - Elasticity of Supply – Producer surplus.

**Unit IV: Exchange and Theory of Distribution**

Exchange and Distribution: Definition – Pricing of factors of production - Marginal productivity theory of distribution - Rent and Quasi rent - Wages: Real wage and money wage - Interest: Pure interest and gross interest – Profit: Meaning of economic profit.

**Unit V: Macroeconomic Concepts**

Macroeconomics: Definition and Subject matter – National Income: Concepts – GNP, GDP, NNP, Disposable income and Per capita income – Money: Definition, Types and functions of money - Inflation: Meaning, types of inflation - Public Finance: Meaning, Principles - Public Revenue: Meaning, Classification of taxes - Canons of Taxation - Public expenditure: Principles – Welfare Economics: Meaning, Pareto’s optimality.

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| **TEXT BOOKS** | |
| 1 | Dewett, K. K. 2004. Modern Economic Theory, Syamlal Charitable Trust, New Delhi. |
| 2. | Mankiw, G.N., Principles of Microeconomics, Cengage Learning. Chapter 1. |
| 3. | Samuelson, P. 2004. Economics, (18/e), Tata Mc-graw-Hill, New Delhi` |
| 4. | Seth, M. L. 2005.Principles of Economics, Lakshmi Narain Agarwal Co., Agra. New Delhi |

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| **SEMESTER: III**  **PART: IV** | **22UNFDS38**  **CONFECTIONERY TECHNOLOGY** | **CREDIT: 2**  **HOURS: 2 hours/week** |

**COURSE OBJECTIVES**

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| 1. Learn the technologies of confectionery products |
| 1. Understand the principles and types of confectionery products 2. Gain knowledge of commercial production of the products |

**Unit I: Introduction to processing of confectioneries**

Confectionery production principles, production process, Classification – sugar and cocoa confectioneries, flour and milk based Indian confectioneries. Confectionery and chocolate products – types, specifications, compositions,

**Unit II: Types of sugars and ingredients**

Sugar sources, methods of preparation of sugars, Role of sugar, jaggery, khandsari, raw and refined sugar, liquid sweeteners, non-sweeteners and synthetic sweeteners; Role of shortenings, starch, milk and milk products, egg albumen and other aerating agents; Role of cocoa powder, fruits, preserved fruits, jam, dried fruits , and nuts; Role of chemical additives in confectionery

**Unit III: Processing of crystalline and non-crystalline candies**

Reactions of sugars - stages of sugar cookery, factors affecting sugar cookery, principles of sugar cookery; formulations and processing of Crystalline candies – fondant and fudge, aerated candies – nougat and marshmallows,taplets and pan coated candy, Non-crystalline candies – caramels, toffee, brittles, lollipop, fruit drops; Gummies and jelllies, jujups; marzipan.

**Unit IV: Processing of chocolate and compound coatings**

Cocoa processing – cocoa powder and cocoa butter processing, chocolates manufacturing – ingredients, composition, mixing, refining, conching, tempering, molding and enrobing; Application of sugar and cocoa confectioneries – baked products decorations - glazing, icings, sandwiches, and other confections

**Unit V: Processing equipment, Packaging and quality analysis**

Machinery requirements for confectioneries, packaging requirements and methods, storage and product quality testing – quality characteristics, defects in confectionery applications, causes and corrective measures.

**Practicals**

1. Determine the effect of heat on sugar solution and perform cold water test
2. Study the process of inversion, melting and caramelization of sugar
3. Identifications and composition of various ingredients for confectionery products
4. Preparation soft candies - fondant, fudge and pralines
5. Preparation of marshmellow and jujubs
6. Preparation of divinity and nougat
7. Preparation hard candies - caramel, toffee and gummies
8. Preparation of butterscotch and brittles
9. Preparation of pulled taffy
10. Preparation of spun candy
11. Preparation of chocolates
12. Preparation of Indian confection - shakarpara and chhana murki
13. Preparation of milk based confection
14. Preparation of gram based confection
15. Preparation of cremes and marzipan for decorations
16. Visit to confectionery units (industry)
17. Final practical examination

**COURSE OUTCOMES**

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| 1. This course will enable the students to understand the concepts and principles of preparation of sugar, cocoa and Indian confectionery products. 2. Provide an experience of confectionery products with an emphasis on special dietary needs 3. Impart knowledge on functions of ingredients used in various confectionery products 4. Understand the status of the confectionery industry in India 5. To know about innovations in this sector |

**Text Books**

1. Beckette S.T. (2009). Industrial Chocolate Manufacture, Blackwell Publishing Ltd.
2. Minifie B.W. (1999). Chocolate, Cocoa and Confectionary, Aspen Publication.
3. Bernard,W. Minifie, 1997.Chocolate, Cocoa and Confectionery, CBS Publishers and Distributors, New Delhi.
4. SIRI Board of Consultants and Engineers. Hand Book on Confectionery Industries. Published by Small Industry Research Institute.4/43. P.O Box- 2106, Roop Nagar, New Delhi - 110007.

**Outcomes Mapping**

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|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
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| **SEMESTER: IV**  **PART:III** | **22UNFDC43: FOOD MICROBIOLOGY** | **CREDIT:4**  **HOURS/WEEK:5** |

**COURSE OBJECTIVES**

1. To acquire an elementary knowledge about microorganisms
2. Gain knowledge on the role of micro-organisms in health and diseases.
3. To understand the role of micro-organisms in spoilage of various foods.
4. To gain knowledge of micro-organisms in relation to food and food products.
5. To develop critical thinking about problems and issues concerning beneficial and harmful microorganisms in food.

**UNIT-I Introduction to Microorganisms**

1. Introduction to Microbiology and its relevance to everyday life.
2. General Characteristics of Bacteria, Viruses, Yeast, Molds, Protozoa, Algae.
3. Bacteria: Bacterial cell, Morphology, Reproduction, function and Factors affecting Bacterial Growth-(Physical factors and nutritional factors),
4. Viruses: Morphology, Classification, Phages-Lifecycle, functions.
5. Yeast: Morphology – Cell structure multiplication (Budding), functions.
6. Factors affecting the growth of micro-organisms-temperature, water activity, pH, oxygen and redox, interaction of factors and between organisms.

**UNIT-II: Introduction and Scope Of Food Microbiology its origins**

1. Introduction of microbiology and its relevance to everyday life.
2. General characteristics of bacteria, fungi, virus, protozoa, and algae.
3. Identification of microorganisms
4. Morphological characteristics important in food bacteriology  
   Industrial importance Beneficial effect of organism
5. Some applications of microorganisms-Foodproducts Alcoholic drinks, Dairy products, Bread, Vinegar, Pickled foods, Mushrooms, Single-cell protein

**UNIT III: Microorganisms in Food Products**

1. Importance of microbes in food biotechnology, genetic all engineered organisms, probiotics and single cell proteins.
2. Fermentation: Aerobic and Anaerobic respiration. Products of Fermentation-Brief knowledge on the preparation of Bread, Malt beverages, Wine, Distil liquor, Vinegar, Fermented Vegetables and Dairy products

**UNIT-IV: Contamination and Spoilage of Foods**

1. Principles of food spoilage by microbiological, physical and biological factors-Causes of spoilage –Classification of foods based on spoilage–factors affecting–kinds and numbers of micro-organism in food; Growth and chemical changes caused by microorganisms.
2. Contamination, preservation and spoilage of cereal and cereal products, baked products, Fruits and vegetables and their products, Fleshy foods, Milk and Milk products, Egg and Egg Products, and Fats and oils.
3. Food Spoilage- Nature, Causes, Contamination, Composition of spoilage, Changes in foods caused by spoilage organisms
4. Influence of processing,
5. Spoilage of important food commodities and food products-Meat, Fish, Egg and Milk, Fruits and Vegetables, Cereals.

**UNIT-V–Microorganisms In Food poisoning, Food infections And Food Borne Diseases**

1. Microbial food poisoning by Staphylococci Salmonella and clostridium botulinum (Botulism). Measures to prevent microbial food poisoning.
2. Public health hazards due to contaminated foods- Food borne Infections and Food intoxication symptoms, mode of transmission and methods of prevention of Dysentery diarrhea, Typhoid, Cholera.

**COURSE OUTCOMES**

1. Understanding the various types of microorganisms, general characteristics and role in everyday life
2. Understand the scope of food microbiology and beneficial effect in food microbiology
3. Understand the role of microorganisms in food products
4. Understand the contamination and spoilage of foods
5. understand the microorganisms in food poisoning, food infections and food borne diseases

**Text Books**

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| --- | --- |
| 1. Adams, MR and Moss, MO (2005) Food Microbiology, New Age International (PLtd)., New Delhi. 2. Jay M.J (2005) Modern Food Microbiology, Fourth Edition, CBS Publishers and Distributors, New Delhi. 3. Tamine, A (2005) Probiotic Dairy Products, Blackwell Publishing, USA. 4. Cappuccino G.J and Sherman, N (2008) Microbiology – A Laboratory Manual, Pearson Education Publishers, USA,   **Supplementary Readings**   |  | | --- | | 1. Ramesh, K.V (2007) Food Microbiology, MJP Publishers, Chennai. 2. Frazier, W.C, Food Microbiology, McGraw Hill Publications, NewYork,4th Edition, 1998. 3. Pelczar, H.J. And Rober. D, Microbiology, McGraw Hill Publication, New York, 10thEdition,1998. | |

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| **SEMESTER:IV**  **PART:III** | **22UNFDP44: HUMAN NUTRITION PRACTICALS** | **CREDIT:3**  **HOURS /WEEK:4** |

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| **COURSE OBJECTIVES**  To enable the students to:   1. Describe role of food in human nutrition 2. Determine the Energy requirement by various age groups. 3. Understand the effect of lipid on health status. 4. Classify the protein based on the quality. 5. Describe the Role of vitamins and minerals.   **UNIT - I: Basic concepts of Nutrient**  Basic concepts of Nutrient, Carbohydrates - Definition, Sources, requirements, Digestion and absorption and metabolism. Dietary fibre definition, types-soluble and insoluble fibre, sources of fibre, physiological effects of dietary fibre, role of fibre in human nutrition,  requirements. Water -functions, water compartment, regulation, water balance, and  disorders of water balance.  **UNIT – II: Energy**  Energy units, determination of energy value of foods using Bomb calorimeter, gross calorific values, Physiological energy value of foods, determination of energy requirement using direct calorimetry. RQ, SDA of food, indirect calorimetry – Basal metabolism - definition, determination, factors affecting BMR - determination of energy metabolism during work - energy requirements for various types of activities, recommended dietary allowances for energy for various age groups.  **UNIT – III: Lipids**  Lipids - Definition, sources, requirements and functions. Digestion, absorption and metabolism Essential Fatty Acids (EFA) - definition, functions, sources and effects of deficiency. Protein - Definition, , sources, requirements and functions. Amino acids - Indispensable and dispensable amino acids - special function of amino acids – protein deficiency - Evaluation of protein quality - PER, BV, NPU, NPR, chemical score, mutual and amino acid supplementation of proteins.  **UNIT - IV**  Vitamins Fat soluble vitamins and Water soluble vitamins - functions, deficiency, sources, requirements and hyper-vitaminosis.  **UNIT-V: Minerals**  Macro, Micro and Trace elements - functions, sources, requirements and deficiency.  Selenium and Vitamin E relationship, Chromium and glucose tolerance factor.  **HUMAN NUTRITIONPRACTICALS**   1. Quantitative estimation of reducing sugar by Benedict’s method 2. Quantitative estimation of calcium 3. Quantitative estimation of phosphorous. 4. Quantitative estimation of vitamin C. 5. Demonstration Experiments. 6. Estimation of total nitrogen in foods (Micro or Macro kjeldahl method) 7. Lipid extraction 8. Demonstration of Iodine value 9. Estimation of Iron   **COURSE OUTCOMES**   1. Gain knowledge on various nutrient analysis of foods 2. Understand the estimation of sugars and nitrogen 3. Understand the techniques of estimation of lipids 4. Gain knowledge on qualitative and quantitative analysis on nutrients present   in the given solution.   1. Gain knowledge on estimation of calcium and iron   **Text Books**   1. Shubhangini. A. Joshi; Nutrition and Dietetics III edition, McGraw Hill Education (India) private limited ,2015. 2. Srilakshmi. B; Nutrition Science, 15th edition, New Age International (P) Limited, Publishers, 2016. 3. Swaminathan. M; Advanced Text-Book on Food and Nutrition, Volume I 2nd edition. The Bangalore Printing and Publishing Co., LTD, Reprint 2015. 4. Mahtab S. Bamji, Prasad Rao, N. Vinodini Reddy; Textbook of Human Nutrition, Second Edition Oxford and IBH Publishing Co. Pvt .Ltd, 2003. 5. Judith E. Brown., Nutrition Now, 2nd edition, West / Wadswroth west /   Wadsworth, An International Thomson publishing company, 1998.  **Supplementary Readings**   1. Sunetra Roday; Food Science and Nutrition, 2nd edition, Oxford University Press,2013 2. Carol Byrd - Bredbenner; Wardlaw’s perspecctives in Nutrition, 9th edition MCGraw Hill International Edition 2013 3. Gordon.M.Wardlawet.al;ContemporaryNutrition,2ndedition,Publishingby Mosby, 2004. 4. William’s; Nix; Basic Nutrition and Diet therapy, 14th edition, Publishing by Mosby, 2013. 5. Srilakshmi.B; Dietetics,7th edition, New Age International(P) Limited Publishers, 2014. 6. Varley, H., Gowenlak, A.H. and Hill, M. Practical Clinical Biochemistry, 7. William Itinmaon Medical Books, London, 2000. 8. Oser, B.L., Harke’s Physiological Chemistry XIV Edition Tata McGraw Hill 9. Publishing Company Ltd., Bombay, 2001 10. Sadasivam, S. and Manickam, A. Biochemical Method, 11. Second Edition, New Age International P. Ltd., Publishers, New Delhi, 2003. 12. Raghuramulu, N., Madhavan nair, K. and Kalyana Sundaram, 13. National Institute of Nutrition, 2013, A Manual of Laboratory Techniques, Hyderabad, 500007   **Outcomes Mapping**   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | | **CO1** | **3** |  |  |  |  | | **CO2** |  | **2** |  |  |  | | **CO3** |  |  | **2** |  |  | | **CO4** |  |  |  | **2** |  | | **CO5** |  |  |  |  | **2** |  |  |  |  | | --- | --- | --- | | SEMESTER:IV  PART:III  ALLIED II | 22UNGCA04: GUIDELINES AND COUNSELING | CREDIT:4  HOURS /WEEK:4 |     COURSE OBJECTIVE  The learners will be able to   1. Understand the techniques of counselling. 2. Develop communication skill. 3. Acquire knowledge on assessment of needs of the clients 4. Understand special areas in counselling. 5. Knowledge on different types of counseling.     Unit I: Defining features of counselling  Role of a dietician in a hospital and community, team approach to nutritional care, ethical code and responsibility. Defining features of counselling psychology.  Unit II: Counseling process and Qualities of Counsellor  Counseling process- steps in counsellor process and followup ; Variables affecting the counseling process .Qualities and skills required for the counsellor-educational and professional.  Unit III: Types of Guidance and Counselling  Types of guidance –educational, vocational, personal and Health. types of counseling-directive, non directive and elective counseling . Methods of guidance and counseling –individual and group counseling. Ethical and Legal Issues in Counselling. Ethical Standards and Laws. Ethical Decision Making.  Unit IV : Family and Special areas in counseling  Family counseling –counseling the individual for marriage and family life, the parents of children with ADHD and behavioral problems - teen counseling, counseling the family in depression, suicide, stress and single parenting. Special areas in counseling –old age, women’s issues, stress management and relief, post-traumatic stress, grief and depression.  Unit V : Diet Counseling  Diet Counseling - definition, concept, the role of clinical dietician, the recipients, counseling environment. Factors to be considered for counseling - Nutritional and health conditions, psychological conditions, food allergies, aging, gender related and other problems. Assessment component - Methods of interview – verbal and nonverbal techniques. Counseling models – data analysis (dietary, biological, environmental, behavioral data). Designing of counseling plans – goals and objectives, resource planning – client care plan and designing evaluation instruments. Implementation component - counseling the client/patient – client concurrence, co-ordination of care plans-the provision of learning experience. Evaluation component - Measuring the success of performance of client and evaluating the counseling process.  COURSE OUTCOME:  The learners will be able to:   1. Understand the psychology of the patient 2. Develop diet counseling skills 3. Create awareness among the communities about the importance of diet and good health 4. Develop comprehensive knowledge on steps in the process of counseling 5. Gain knowledge to regulate /correct various crisis in the life   TEXT BOOKS   1. Madhukar,I.2007. Guidance and Counseling; Authors press publication; New Delhi. 2. Chandra, R.2007.Guidance and Counseling, Kalpaz Publication , New Delhi. 3. Pushpa, G, Amutha, S. and Poornakala, S.J. 2015. Teaching manual on Family Guidance and Counseling. 4. Agrawal, R. 2006. Elementary Guidance and Counseling. Shirpra Publication, Delhi., 5. 4.Muhammad, M. 2007. Teacher’s Handbook of Counseling. Saujanya Publisher, New Delhi.   Supplementary Readings   1. Journal of Family ecology 2. www.childandfamilyguidance.org 3. Indian Journal of community guidance service 4. Journal of community guidance and research  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | | **CO1** | **2** |  |  |  |  | | **CO2** |  | **2** |  |  |  | | **CO3** |  |  | **3** |  |  | | **CO4** |  |  |  | **2** |  | | **CO5** |  |  |  |  | **2** |      |  |  |  | | --- | --- | --- | | **SEMESTER:IV**  **PART: III**  **ALLIED: II** | **22UNFDP02**: **FOOD PRODUCT DEVELOPMENT PRACTICAL** | **CREDIT: 3**  **HOURS: 3/W** |   **Course Objectives**   |  | | --- | | 1. Understand the concept of development of a new product | | 1. Prepare new products based on special dietary requirements, functionality, convenience | | 1. Understand the steps in new food product development | | 1. Gain knowledge on the product development process in the food industry | | 1. Learn the marketing strategy for the developed food product | | 1. Improvisation of existing traditional Indian foods |   **Practical**  Development of New Product: Definition, Importance, objectives and Need of product development, Reasons of failure, Types and Steps of product development, Product development Tools and their use.  **Projects on**   1. Market and literature survey to identify the concepts of new products 2. Screening of product concept on the basis of techno-economic feasibility 3. Development of prototype product and Standardization of formulation process 4. Proximate Analysis of New Product 5. Packaging, labeling, and shelf-life studies 6. Cost analysis and Final Project Report   Each team/group of students would develop a food product on the basis of above-mentioned lines /steps and would submit a project report  **Course Outcomes**   |  | | --- | | 1. Be aware of the need for the development of new food product | | 1. Acquaint the skills involved in the development of food products and their management and | | 1. Apply the nuances of commercialization and evaluation of the developed product |   **Text Books**   |  | | --- | | 1. Moskowitz, Howard and Saguy ,R. I. Sam 2009. An Integrated Approach to New Food Product , CRC Press. | | 1. Mary D. Earle and Richard L. Earle (2009) Creating New Foods The Product Developer's Guide by, Chadwick House Group Ltd, UK. | | 1. Anil Kumar, S., Poornima, S.C., Abraham, M.K.& Jayashree, K.2004. Entrepreneurship Development. New Age International Publishers. | | 1. Fuller, Gordon W. 2004. New Product Development- From Concept to Marketplace, CRC Press. | | 1. Gordon W. Filler (1994) New Food Product Development from Concept to Market Place, CRC Press London, New York |   **Supplementary Readings**   |  | | --- | | 1. Earle M., Earle R., Anderson A. (2007) Food Product Development. Marketing approach, Science and Technology Publishing House, Warsaw. 2. Peter S. Murano (2003), Understanding Food Science and Technology, Wadsworth Publishing, Australia, Canada | | 1. M Earle, R. Earle and A. Anderson (2001) Food Product Development: Maximising success, Wood head publishing series in Food Science, Technology and Nutrition No 64 | | 1. Mary D. Earle and Richard L. Earle, (2000), Creating New Foods – The Product Developer‟s Guide the Web Edition, 2009. Publisher: The New Zealand Institute of Food Science & Technology (Inc.) | | 1. David Marshall, (1995) Food Choice and the Consumer, 1st edition, Blackie Academic& Professional, London |  |  |  |  | | --- | --- | --- | | SEMESTER: IV  PART: IV  NME II | 22UNFDN47  FOOD CHEMISTRY | CREDIT: 2  hours/week:2 |   COURSE OBJECTIVES   |  | | --- | | 1. To learn about the food and cereals. | | 1. To recognize the importance of sugar, vegetable and fruits. | | 1. To identify various beverages, appetizers. | | 1. To acquire knowledge about food preservation. 2. To know about food additives. |   UNIT - I: FOOD, CEREALS. HOURS: 6  Food: Definition – classification – Energy yielding – Body building and protective foods, functions. Nutrients – Types of nutrients – Proteins, Carbohydrates, Fats, Minerals and Vitamins – Importance of nutrients.  Cereals - Definition – Classification - Processing - Structure of Cereals - Composition and Nutritive value – Pulses - Definition - Classification - Processing - Structure of Pulses - Composition and Nutritive Value - Toxic Constituents in Pulses - Medicinal value of Cereals and Pulses.  UNIT - II: SUGAR, VEGETABLES AND FRUITSHOURS: 6  Sugar - Structure and Properties - Nutritive value - Sugar composition in different food items. Sugar related products - Classification and Nutritive value - Artificial sweeteners – Examples – Saccharin and Cyclamate - Advantages and Disadvantages.  Vegetables and Fruits - Classification - Composition and Nutritive values. Importance and Nutritive value of some common foods - Milk, Egg and Soyabeans.  UNIT -III: BEVERAGES, APPETIZERS HOURS: 6  Beverages - Definition - Examples – Classification. Fruit Beverages - Milk Based Beverages - Malted Beverages - Examples – Alcoholic and Non-Alcoholic Beverages – Examples. Appetizers - Definition - Classification - Examples - Water - Functions and Deficiency.  **UNIT-IV: FOOD PRESERVATION AND PRESERVATIVESHOURS: 6**  Food preservation -Definition- Classification - Food Spoilage. Preservatives-Sodium benzoate - Benzoic acid - Sodium chloride, Sugar – Acetic acid – Sulphur dioxide – Sorbic acid. Methods of preservation and processing – By heat – Canning and Pasteurisation – Drying – Advantages – Methods of drying – vacuum drier.  UNIT -V: FOOD ADDITIVES HOURS: 6  Food additives- meaning-Direct and Indirect additives-Functions of food additives – Anti-oxidants- Emulsifying agents-Humectants-Stabilizers-Surface active agents-Artificial Sweeteners-Flavouring agents-Anti-caking agents. Food Colours – Restricted use – Spurious Colours – Taste Enhancers – MSG – Vinegar.  COURSE OUTCOMES   |  | | --- | | 1. Describe the food and cereals. | | 1. Analyse sugar, vegetable and fruits. | | 1. Know about beverages, appetizers. | | 1. Explain food preservation. | | 1. Analyse food additives. |   TEXTBOOKS: (IN API STYLE)   1. Curtis P. A. (2013), An operational Text Book, Guide to Food Laws and regulations, Wiley Blackwell publishers, 2nd Edn.,UK. 2. Negi J. (2016), Food & Beverage Laws - Food Safety and Hygiene. ABD Publishers : Distribution, India. 3. Alex Ramani V (2009) Food Chemistry-MJP Publishers, Chennai. 4. Food Chemistry (2004) Lillian Hoagland Mayer, CBS Publishers and Distributers, Delhi. 5. Food Science (2005), B. Srilakshmi, III Edition, New Age International Publishers.   SUPPLEMENTARY READINGS   1. Foods Facts and Principles by N.Shakuntala Manay & M. Shadakshara swamy, Wiley Eastern Ltd, New Delhi. 2. Food Chemistry by Seema Yadev, Anmol Publication, New Delhi. 3. Applied Chemistry by Jayashree Ghose 4. Fundamentals of Foods and Nutrition - Mudambi R. Sumathi, and Rajagopal, M. V., - Wiley Eastern Ltd., Madras. 5. Handbook of Food and Nutrition - M. Swaminathan - Bangalore Printing and Publishing Co. Ltd., Bangalore.   OUTCOME MAPPING   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | | **CO1** | **2** | **3** | **2** | **3** | **2** | | **CO2** | **3** | **2** | **2** | **3** | **3** | | **CO3** | **2** | **3** | **3** | **3** | **3** | | **CO4** | **3** | **3** | **3** | **3** | **3** | | **CO5** | **3** | **2** | **2** | **2** | **2** |  |  |  |  | | --- | --- | --- | | **SEMESTER: IV**  **PART: IV** | **SKILL BASED SUBJECT - II**  **22UNFDS48: BAKING TECHNOLOGY** | **CREDIT: 2**  **HOURS/WEEK : 2** |   **COURSE OBJECTIVES**   |  | | --- | | 1. To learn the technologies behind bakery products | | 1. To understand the fundamentals of baking 2. To gain knowledge of commercial production of the products |   **Unit I : Bakery and Bread products**  Bakery Industry - current status, growth rate, and economic importance. Baking - principles, classifications, specifications, nutritional quality and safety of products, pertinent standards & regulations. Ingredients functions - major or bulk ingredients - flour characteristics, types of flour, quality assessment of flour - minor ingredients - micro ingredients.  Formulations and processing of bread - dough mixing methods, different varieties of bread, role of ingredients - product quality characteristics, faults and corrective measures - machineries required - packaging requirements and methods - storage and quality testing  **Unit II: Sponges and Cakes**  Formulations and processing of sponges and cake - batter mixing techniques, types of fancy cakes - product quality characteristics, faults and corrective measures - cake decorations - different types of icings - tools and machineries required - packaging requirements and methods - storage and quality testing  **Unit III: Biscuits and Cookies**  Formulations and processing of biscuits and cookies - classification - mixing methods - various types of biscuits - according to mixing methods, according to machine used for production - product quality characteristics, faults and corrective measures - tools and machineries required - packaging requirements and methods - storage and quality testing  **Unit IV: Pastries and Pie**  Formulations and processing of pastries and pie - methods and types - folding techniques - product quality characteristics, faults and corrective measures - machineries required - packaging requirements and methods - storage and quality testing  **Unit V: Modified Bakery Products**  Modifications of bakery products for people with special nutritional requirements – use of alternative ingredients and substitutes – high fibre, low sugar, low fat, gluten free bakery products.  **Practical**   1. Identifications and composition of various ingredients 2. Determination of gluten content in flour 3. Determination of dough raising capacity 4. Preparation of bread and its evaluation 5. Determination of effect of ingredients - yeast, fat, sugar 6. Different bread making methods - straight, sponge-dough, activated dough development 7. Preparation of bread products - buns, rusk, rolls, doughnuts, pizza base 8. Preparation of biscuits and its evaluation 9. Determination of effect of ingredients – sugar, fat, GMS, starch, lecithin 10. Preparation of cakes – sponge cake and decoration 11. Preparation of sponge cake with icing and its evaluation 12. Preparation of cookies and its evaluation 13. Preparation of puff pastry and its evaluation 14. Preparation of pastry products – danish and croissants 15. Preparation of pie pastry and its evaluation 16. Visit to bakery industry 17. Final examination     **COURSE OUTCOMES**   |  | | --- | | 1. Enable the students to understand the concepts and principles of preparation of bakery products | | 1. Provide an experience of baking products with an emphasis on special dietary needs 2. Impart knowledge on functions of ingredients used in various bakery products 3. To understand bakery industry trends 4. To know about innovations in bakery sector |   **Text Books**   |  | | --- | | 1. Dubey, S.C. (2007). Basic Baking 5th Ed. Chanakya Mudrak Pvt. Ltd. | | 1. Sarah R.Lebensky, Pricilla et al., (2004)Textbook of Baking and Pastry Fundamentals, third edition, Pearson Education Ltd, 2. Kamaliya, M.K. and Kamaliya, K.B. 2001. Baking: Science and Industries, Vol.1 and 2. Publisher: M.K.Kamaliya, 42, Ashruti Bunglows, Jitodia Road, Anand -388001. |   **Supplementary Readings**   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | 1. Dubey, S.C.1992. Basic Baking Science and Craft. Published by G.N. Dangi, G.D. Enterprises, B -13, Ist floor, Bombay - 400002. 2. The Culinary Institute of America, Baking & Pastry: Mastering the Art and Craft, John Wiley & Sons,Inc New Jersy. 2009 3. Barndt R. L. (1993). Fat & Calorie – Modified Bakery Products, Springer US | | | | | | | 1. Samuel A. Matz (1999). Bakery Technology and Engineering, PAN-TECH International Incorporated. | | | | | | | 1. Faridi Faubion (1997). Dough Rheology and Baked Product Texture, CBS Publications.   **Outcomes Mapping** | | | | | | |  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | | **CO1** | **2** |  |  |  |  | | **CO2** |  | **2** |  |  |  | | **CO3** |  |  | **3** |  |  | | **CO4** |  |  |  | **2** |  | | **CO5** |  |  |  |  | **3** | |

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| **SEMESTER: IV**  **PART: IIII** | **22UNFDC51. DIETETICS** | **CREDIT:4**  **HOURS:4**  **HOURS/** |

**COURSE OBJECTIVES**

To enable students:

1. Understand the role of modified diet for prevention of diseases
2. Understand the principles menu planning and serving therapeutic diet.
3. Develop a skill to Calculate nutritive values of Therapeutic diet
4. Develop a capacity to Plan and prepare therapeutic diet for ill health condition
5. To obtain knowledge on the role of diet in disease conditions.

**UNIT – I: DIET THERAPY**

Definition, purpose and principles of a therapeutic diet, factors to be considered in the modification of normal diet into therapeutic diets. Types of hospital diet – Clear fluid, full fluid, soft, light, bland and regular diet. Special feeding methods – tube feeding, parenteral nutrition.

**DIETITIAN: –** Role of dietitian in managing hospital dietary.

**UNIT – II:DIABETES MELLITUS**

Prevalence, Types – Type-I, Type-II, Malnutrition Related Diabetes Mellitus, Gestational Diabetes Mellitus, Etiology, symptoms, nutritional requirements and dietary management of Diabetes Mellitus – (Glycemic Index, Food exchange list) and complications.

**UNIT – III CARDIOVASCULAR DISEASE**

Prevalence, Pathogenesis, Symptoms, risk factors and modification of diet in cardiovascular disease – Atherosclerosis, Hypertension and Hypercholesterolemia.

**UNIT – IV DIET IN INFECTIONS, FEVERS AND HIV**

Host defense mechanisms causes and general dietary conditions of fevers – Symptoms and signs of Typhoid, Influenza, Malaria, Tuberculosis and pneumonia Symptoms and signs of HIV and diet for the HIV patients.

**UNIT – V:DISEASES OF THE GASTRO INTESTINAL TRACT:-**

Causes, Symptoms and Dietary management of Gastritis, Peptic ulcer, diarrhea, constipation, Ulcerative colitis, diverticulous, Irritable Bowel Syndrome, malabsorption syndrome – Crohns Disease, Sprue/ Tropical Sprue, hemorrhoids, ulcerative colitis.

**COURSE OUTCOME**

1. Able to understand principles of diet therapy
2. Able to modify normal diet for therapeutic purpose
3. Understand the role of dietitian
4. Gain knowledge about etiology, risk factors and clinical features of various disease conditions
5. Develop a skill to Calculate nutritive values of Therapeutic diet

**Text Books**

1. Michael. J. Gibney etal; Clinical Nutrition Black well Science, 2005.
2. Shubhangini. A. Joshi; Nutrition and Dietetics, 3rd edition, McGraw Hill Education (India) Private Limited.
3. Srilakshmi . B; Nutrition Science, 15th edition, New Age International (p) Limited, publishers, 2016.

**Supplementary Readings**

1. Srilakshmi, B. 2015. Dietetics. New Age International Pvt. Ltd. New Delhi
2. Swaminathan, M. 1986 Principles of Nutrition and Dietetics The Bangalore Printing and Publishing Co., Bangalore.
3. Sunetra Roday; Food Science and Nutrition.
4. Carol Byrd – Bredbenner; Wardlaw’s perspectives in Nutrition

**Outcomes Mapping**

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| **SEMESTER: V**  **PART: III** | **22UNFDC52.**  **PUBLIC HEALTH NUTRITION** | **CREDIT:4**  **HOURS/WEEK::4** |

**COURSE OBJECTIVES**

To enable the students to:

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| 1. Understand role of Community Nutrition to maintain the health status |
| 1. Understand nutrition problems existing in the community. |
| 1. Develop a skill to assess nutritional status of the community |
| 1. Knowledge to apply nutrition policy and programs in alleviating nutritional problems. |
| 1. Inculcate the skills to deliver nutrition services. |

**UNIT-I:Nutrition and Health in National Development**

Concept of Community, Types of Community, Factors affecting the health of community. Malnutrition - Etiology , symptoms, Prevalence of malnutrition, factors contributing to malnutrition - Under nutrition and Over nutrition, balance between food and population growth.

**UNIT-II:Nutritional problems confronting our country**

PEM - Prevalence, classification - Kwashiorkor and Marasmus - etiology, symptoms, pathological changes, biochemical changes, Anaemia - Prevalence, etiology, symptoms, prophylaxis programmes. IDD - Etiology, Prevalence, symptoms, prophylaxis Fluorosis - Etiology, prevalence, symptoms, prophylaxis. Vitamin A deficiency - Etiology, prevalence, symptoms, prophylaxis.

**UNIT-III:Methods of assessment of Nutritional status**

sampling techniques – identification of risk group. Direct assessment – anthropometry, biochemical estimation, clinical, and diet survey. Indirect assessment - Food balance sheet, Agricultural data, Ecological parameter and vital statistics, use of growth chart.

**UNIT-V:Strategies to combat Nutritional problems**

fortification, enrichment, supplementation and Immunization programmes. Nutrition Education - Meaning, Scope, Methods - Planning, conduct of evaluation of Nutrition education Programme.

**COURSE OUTCOMES**

1. Understand the role of interventions to enhance wellness in diverse individuals and groups
2. Skills to develop an educational program for a target population
3. Capable to formulate new food products for a target group
4. Evaluate impact of nutritional awareness program on Nutritional and health status
5. Understand the skills to deliver nutrition services.

**Text Books**

1. Agarwal A.N, Indian Economy, Problems of development and planning, Publications, 1981.
2. Park J.E. and park K. Text book of preventive and social medicine, Publications, 1994.
3. B. Srilakshmi, Nutrition Science New Age International (CP) Ltd, New Delhi, 2002.

**Supplementary Readings**

1. Mahtab, S. Bamji, N. Pralhad rao, Vinodini Reddy, Text book of Human Nutrition, Oxford and IBIT Publishing co Pvt. Ltd, New Delhi, reprint 1999.
2. Shukla,P.K., Nutritional problems of India,1982.
3. Dietary guidelines for Indians, ICMR, NIN, Hyderabad 2020.
4. Bamji, M.S, Prahalad Rao N, Reddy V, Textbook of Human Nutrition II Edition, Oxford and PBH publishing Co. Pvt. Ltd, New Delhi 2004.

**Outcomes Mapping**

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| **SEMESTER: V**  **PART: III** | **22UNFDC53**  **CLINICAL NUTRITION** | **CREDIT:4**  **HOURS/WEEK:4** |

**COURSE OBJECTIVES:**

To enable the students to:

1. Understand the clinical signs and symptoms nutrient deficiency
2. Gain knowledge on the clinical diagnosis in nutrient deficiency and metabolic disorder
3. To understand the clinical signs and symptoms in various disease conditions
4. Role of high energy diets in degenerative diseases - interface between energy metabolism, diet and disease.
5. Understand the effect of diet and nutritional status on drug effectiveness

**UNIT I: Introduction to Clinical Nutrition**

Concept of clinical nutrition – scope and importance. Clinical signs and symptoms in various disease conditions. Interface between metabolism, diet and disease.

**UNIT II: Clinical Diagnosis in Nutrient Deficiency States**

Metabolic changes and clinical diagnosis in nutrient deficiency diseases - vitamin A deficiency, vitamin D deficiency diseases, vitamin B complex deficiencies, vitamin C deficiency, iodine deficiency disorders, calcium and iron deficiencies.

**UNIT III: Clinical Diagnosis in Disease Conditions**

Metabolic changes and clinical diagnosis in various diseases - Diabetes Mellitus, cardiovascular diseases, renal disorders, liver diseases, and cancer.

**UNIT IV: Clinical Diagnosis in Infections and Inflammatory Conditions**

Metabolic changes and clinical diagnosis in infections – febrile conditions, AIDS, Inflammatory conditions - interventions to prevent undesirable aspects of inflammatory response - anti-inflammatory diets, glycemic control, physical activity, appetite stimulants, anabolic agents, anti-inflammatory agents, anticytokines, and probiotics - preserve body cell mass and vital organ functions.

**UNIT V: Medical-clinical nutrition interface**

Interpretation of report of blood and urine in different disease conditions and deficiency states. Drug and nutrient interaction, effect of drugs on nutritional status. Effect of diet and nutritional status on drug effectiveness.

**COURSE OUTCOMES**

1. Identified signs and symptoms nutrient deficiency
2. Understand the on the clinical diagnosis in nutrient deficiency and metabolic disorder
3. To understand the clinical signs and symptoms in various disease conditions
4. Role of high energy diets in degenerative diseases - interface between energy metabolism, diet and disease.
5. Understand the nutritional status on drug effectiveness

**Text Books**

1. Pathak, N.N. (1997). Analytical techniques in clinical nutrition (manual); Centre of Advanced Studies in Animal Nutrition. IVRI, Izatnagar.
2. Sobotka, L. (Ed.) 2011. Basics in Clinical Nutrition. Galen Publishing House. Czech Republic.
3. Shubhangini. A. Joshi; Nutrition and Dietetics, 3rd edition, McGraw Hill Education (India) Private Limited.

**Supplementary Readings**

1. Srilakshmi . B; Nutrition Science, 15th edition, New Age International (p) Limited, publishers, 2016.
2. Indian Journal of Nutrition and Dietetics.
3. American Journal of Clinical Nutrition.
4. European Journal of Clinical Nutrition

**Outcomes Mapping**

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| **SEMESTER: V**  **PART:III** | **22UNFDC54**  **FOOD SERVICE LAYOUT AND EQUIPMENTS** | **CREDIT:4**  **HOUR/WEEK:4** |

**COURSE OBJECTIVES**

The main objectives of the course are to:

1. Understand the food service industry in detail
2. Understand food Service Facilities, Planning and equipment
3. Establish goals and cost limitations.
4. Understand structural and engineering principles in Layout and Design.
5. Formulate plans and specifications for food needs and operational requirements

**Unit-I:food service institutions**

1. Introduction.Catering industry- definition & classification of food service institutions
2. Classification of food service institutions according to :
3. Function: Profit oriented, service oriented and public health facility oriented.
4. Processing method: Conventional system, commissary system and fast food service systems.
5. Service of food: Self-service, tray service and waiter-waitress service

**Unit- II:Floor planning and layout**

1. Characteristics of typical food service facilities.
2. Floor planning and layout for catering establishment.
3. Characteristics of typical food service facilities
4. Evaluating Foodservice Layouts of facilities

**Unit-III:Catering Equipment.**

1. Introduction, Classification, Factors involved in selection of equipments.
2. Factor involved in purchasing of equipments, Use and care ofmajorequipments.

**Unit-IV;Food preparation and standard portion size**

**Food preparation**

Introduction, Principles of food preparation.Characteristics of food, Principles of food purchasing, Methods of food purchasing, Storages of foods.

**Standard portion sizes.**

Definition of Standard portion size. Portioning equipment’s, Portioncontrol, Use of left over foods.

**Unit-V:Tools management:**

Tools management, Organization chart, Work study, Work simplification, Work improvement.

**Financial management.**

1. Introduction, Principles, Costing, Budgeting, Accounting, and Food cost control methods.
2. Factors affecting food cost, labour cost, operating cost and overhead cost.

**COURSE OUTCOME**

1. Distinguish the difference between design and layout.
2. Evaluate preliminary planning information and feasibility studies for foodservice operations.
3. Describe the financial aspects of food service layout.
4. Describe major maintenance requirements for equipment and facilities
5. Identify major layout guides for foodservice facilities

**Text Books**

|  |
| --- |
| 1. Chris Thomas, Edwin J. Norman, Costas Katsigris 2013 Design and Equipment for Restaurants andFoodservice: A Management View, 4thedition.John Wiley& Sons, 978-1-118-80601-2 2. Kazarian, e , 1997 Foodservice Facilities Planning. 3 rd . ed Van Nostrand Reinhold 0-471-29063-7 3. John C. Birchfield, John Birchfield Jr 2007Design and Layout of Foodservice Facilities, 3rd Edition, John Wiley & Sons 978-0-471- 69963-7 |

**Supplementary Readings**

|  |
| --- |
| 1. Drummond, Karen E. and Lisa M. Brefere. 2013. Nutrition for Foodservice and Culinary Professionals. New Jersey: Wiley. 2. Sethi, Mohini and SurjeetMalhan. 2018. Catering Management: An Integrated Approach. New Delhi: New Age International Private Limited. 3. Puckett, Ruby Parker. 2012.Foodservice Manual for Health Care Institutions, San Francisco: Jossey Bass Publishers. 4. Palacio, June Payne and Monica Theis. 2001. West and Wood’s Introduction to Foodservice. New Jersey: Prentice Hall. |

**Outcomes Mapping**

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| **SEMESTER: V**  **PART:III** | **22UNFDP55**  **DIETETICS PRACTICALS** | **CREDIT: 0**  **HOURS/ WEEK:3** |

**COURSE OBJECTIVE**

1. Understand foods to be included and food to be avoided for various disease
2. Relate various food items and diseases condition
3. Acquire knowledge about dietary department of the hospital
4. Understand different disease
5. Knowledge about different Diet.

**PRACTICALS**

1. Planning diets for the following

* Clear fluid, full fluid and soft diet.
* Diet in febrile conditions- Typhoid, tuberculosis.
* Diet in atherosclerosis and hypertension.
* Diet in ulcer, diarrhoea and constipation.
* Diet in diabetes mellitus with and without insulin.
* Diet in HIV

2. Visit to the dietary department of hospital.

3. Dietary internship program for a month.

**COURSE OUTCOME**

The learners will be able to

1. Provide comprehensive knowledge on principles and planning of therapeutic diets.
2. Acquire knowledge on nutritional needs of normal and sick persons.
3. Assess the nutritional problems of community and effectively manage the nutritional needs of community.
4. Develop capacity and aptitude for taking up dietetics as a profession.
5. Gain knowledge to identify malnutrition problems among the community.

**Text Book**

1. Antia F. P. Clinical Dietetics and Nutrition,2002 4th edition, Oxford university press.
2. Davidson and Passmore, Human Nutrition And Dietetics, Churchill Livingstone publication.
3. Sue Rodwell Williams , Basic Nutrition and Diet Theraphy, 2000 Mosby publication.
4. Garrow J.S, James W. P.T, (2000), Human Nutrition and Dietetics, 10th edition, Churchill Livingston, London.
5. Guthrie H. A, Picciano M. F (1995), Human Nutrition, Mosby, St. Louis Missorie.

**Supplementary Readings**

1. Mohan K. L, Krause M.V (2002), Food , nutrition and Diet Therapy, W.B.Saunders Co, Philadelphia.
2. Srilakshmi B, Dietetics (2006), New Age International Publishing Ltd.
3. Robinson C.H., Lawler M.R, Cheweth W.L; and Gaswick A.E, Normal and Therapeutic Nutrition ,17 th edition, Mac Milan Publishers.

**Outcomes Mapping**

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| **SEMESTER: V**  **PART:III** | **22UNFDP65**  **THERAPEUTIC NUTRITION PRACTICALS** | **CREDIT:4**  **HOURS/WEEK:4** |

**COURSE OBJECTIVE**

1. Understand foods to be included and food to be avoided for various disease
2. Relate various food items and diseases condition
3. Acquire knowledge about dietary department of the hospital
4. Understand about different disease
5. Knowledge about different diet

**PRACTICALS**

1. Planning diets for the following

* .Diet in obesity and under weight.
* Diet in hepatitis and cirrhosis of liver.
* Diet in Nephritis and Nephrosis.
* Diet in phenyl ketonuria
* Diet in galactoseminea
* Diet in fractosuria
* Diet in gallbladder diseases
* Diet in cancer
* Diet in renal calculi
* Diet for COVID19

2. Visit to the dietary department of hospital.

3. Dietary internship program for a month.

**COURSE OUTCOME:**

The learners will be able to

1. Provide comprehensive knowledge on principles and planning of therapeutic diets.
2. Acquire knowledge on nutritional needs of normal and sick persons.
3. Assess the nutritional problems of community and effectively manage the nutritional needs of community.
4. Develop capacity and aptitude for taking up dietetics as a profession.
5. Evaluate the quality of life and in corporate measures to overcome different diseases

**Text Book**

1. Antia F. P. Clinical Dietetics and Nutrition,2002 4th edition, Oxford university press.
2. Davidson and Passmore, Human Nutrition And Dietetics, Churchill Livingstone publication.
3. Sue Rodwell Williams , Basic Nutrition and Diet Theraphy, 2000 Mosby publication.
4. Garrow J.S, James W. P.T, (2000), Human Nutrition and Dietetics, 10th edition, Churchill Livingston, London.
5. Guthrie H. A, Picciano M. F (1995), Human Nutrition, Mosby, St. Louis Missorie.

**Supplementary Readings**

1. Mohan K. L, Krause M.V (2002), Food , nutrition and Diet Therapy, W.B.Saunders Co, Philadelphia.
2. Srilakshmi B, Dietetics (2006), New Age International Publishing Ltd.
3. Robinson C.H., Lawler M.R, Cheweth W.L; and Gaswick A.E, Normal and Therapeutic Nutrition ,17 th edition, Mac Milan Publishers.

**Outcomes Mapping**

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| **SEMESTER: V**  **PART:III** | **22UNFDE58-1**  **ENTREPRENEURIAL DEVELOPMENT** | **CREDIT:3**  **HOURS/WEEK:4** |

**COURSE OBJECTIVES**

1. To familiarize the participants with the concept and overview of entrepreneurship with a view to enhance entrepreneurial talent.
2. To impart knowledge on the basics of entrepreneurial skills and competencies to provide the participants with necessary inputs for creation of new ventures.
3. To explore new vistas of entrepreneurship in 21st century environment to generate innovative business ideas.
4. To understand business opportunity.
5. Knowledge about financing.

**Unit I:Entrepreneurship**

Entrepreneur – Types of Entrepreneurs – Difference between Entrepreneur and Intrapreneur Entrepreneurship in Economic Growth, Factors Affecting Entrepreneurial Growth.

**Unit II: Motivation**

Major Motives Influencing an Entrepreneur – Achievement Motivation Training, Self-Rating, Business Games, Thematic Apperception Test – Stress Management, Entrepreneurship Development Programs – Need, Objectives.

**Unit III: Business**

Small Enterprises – Definition, Classification – Characteristics, Ownership Structures – Project Formulation – Steps involved in setting up a Business – identifying, selecting a Good Business opportunity, Market Survey and Research, Techno Economic Feasibility Assessment – Preparation of Preliminary Project Reports – Project Appraisal – Sources of Information – Classification of Needs and Agencies.

**Unit IV: Financing and Accounting**

Need – Sources of Finance, Term Loans, Capital Structure, Financial Institution, Management of working Capital, Costing, Break Even Analysis, Taxation – Income Tax, Excise Duty – Sales Tax.

**Unit V:**

Support to Entrepreneurs-Sickness in small Business – Concept, Magnitude, Causes and Consequences, Corrective Measures - Business Incubators – Government Policy for Small Scale Enterprises – Growth Strategies in small industry – Expansion, Diversification, Joint Venture, Merger and Sub Contracting.

**COURSE OUTCOMES**

1. Upon completion of the course, students will be able to gain knowledge and skills needed to run a business successfully
2. 2. Identify Entrepreneuatrials skill among public
3. Develops comprehensive business plans.
4. Prepare plans to manage the enterprise effectively
5. Develop major motives influencing entrepreneurs

**Text Books**

1. Donald F Kuratko, “Entrepreneurship – Theory, Process and Practice”, 9 th Edition, Cengage Learning, 2014.
2. Khanka. S.S., “Entrepreneurial Development” S.Chand& Co. Ltd., Ram Nagar, New Delhi, 2013.

**Supplementary Readings**

1. EDII “Faulty and External Experts – A Hand Book for New Entrepreneurs Publishers: Entrepreneurship Development”, Institute of India, Ahmadabad, 1986.
2. Hisrich R D, Peters M P, “Entrepreneurship” 8th Edition, Tata McGraw-Hill, 2013.
3. Mathew J Manimala, "Enterprenuership theory at cross roads: paradigms and praxis” 2 nd Edition Dream tech, 2005.

**Outcomes Mapping**

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| **SEMESTER: V**  **PART: III** | **22UNFDE58-2**  **PROGRAMMES FOR RURAL DEVELOPMENT** | **CREDIT:3**  **HOURS:3** |

**COURSE OBJECTIVES**

To understand

1. The nature of growth and development.
2. To make familiar the students about rural development programmes and process.
3. To understand about employment oriented approach.
4. Knowledge an different act.
5. Acquire knowledge about Rural Development.

**Unit I: Meaning of rural development** Rural Development – Meaning, Nature and Scope – Factors Affecting Rural Growth. Rural Development in India, Indicators of Rural Development.

**Unit II: Approaches to rural development**

Approaches To Rural Development – Early Attempts for Rural Development – Sectoral Approach to rural development, Target group Approach, Employment oriented Approach.

**Unit III: Programmes of rural development**

Rural Development Programmes – Prime Minister Rural Development Fellows Scheme, SabkiYojanaSabkaVikas, SwachhGram.

**Unit IV:**

National Rural Employment Guarantee Act, Bharat Nirmana, Provisions of Urban Amenities In Rural Area, Sansad Adarsh Gram Yojana,

**Unit V: Agencies for rural development**

Agencies For Rural Development – Government, District Rural Developmental Agencies(DRDA), Semi Government Organisations, Ngos, Co – Operative Institutions, Voluntary Agencies For Rural Development. Role of NGOs in Rural Development – Recent Trends.

**COURSE OUTCOMES**

1. Understand the indicators for development of rural India
2. Know the different programmes and agencies for rural development
3. Develop various approaches for rural development
4. Understand various rural development acts
5. Understand role of NGOs in rural development.

**Text Books**

1. K Vijayakumar, Empowerment of weaker section strategies for rural development in India.
2. Vasant Desai, Rural Development in India, Himalaya Publishing House, Mumbai 2012.
3. S.K.Singh, Rural Development Policies and Programmes, Northern book centre New Delhi, 2002.

**Supplementary Readings**

1. Dutta and Sundaram, Indian Economy, S Chand Publications, New Delhi, 2013.
2. Shankar Chatterjee – implementation of rural development.

**Outcomes Mapping**

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|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | **3** |  |  |  |  |
| **CO2** |  | **3** |  |  |  |
| **CO3** |  |  | **2** |  |  |
| **CO4** |  |  |  | **2** |  |
| **CO5** |  |  |  |  | **2** |

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| **SEMESTER: V**  **PART:III** | **22UNFDE58-3**  **NUTRITION FOR THE FAMILY** | **CREDIT:3**  **HOURS/WEEK:4** |

**OBJECTIVES**

To enable the non major students

1. Understand the basic concepts of nutrition.
2. Understand the nutritional demands in various stages of life cycle.
3. Acquire skills in planning adequate meals in different stages of life cycle.
4. Understand different diet.
5. Acquire knowledge on physiological changes.

**UNIT I**

Food groups- basic five, nutritional classification of foods - energy yielding, body building and protective foods - Basic principles of Meal planning – balanced diet- meaning, food guide pyramid.

**UNIT II**

Nutritional needs during Pregnancy and Lactation– dietary guidelines; general dietary problems, Common Nutritional related problems and complications. Nutrition during Lactation - Dietary guidelines for lactating women, Composition of Breast Milk.

**UNIT III**

Nutrition during Infancy and Preschool age - dietary guidelines for infants, advantages of breast feeding, disadvantages of bottle feeding; Weaning foods (definition) and types of supplementary food. Nutritional needs of Pre-school children, factors to be considered while planning meals for pre-school children. Food habits of Pre School Children.

**UNIT IV**

Nutrition for School children and Adolescence - dietary guidelines, factors considered in planning packed lunch. School lunch feeding problems. Nutrition during Adolescence – general dietary guidelines; Dietary Problems (Eating Disorders)

**UNIT V**

Nutritional needs of Adults and Old Age - dietary guidelines for adults. Nutrition during Old age - physiological changes in ageing, psycho-social factors affecting food intake. Nutrition modification in Diet.

**COURSE OUTCOMES**

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

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| 1. Physiological changes and hormones involved during pregnancy and lactation. |
| 1. Plan a healthy food choice for physical, physiological, psychological aspects in infancy. 2. The students will be able to relate nutrient needs to developmental stages and plan diets which will adequately meet nutritional needs during childhood. 3. The student will learn the impact of growth and development in arriving at the nutritional needs of adolescents. 4. Determine nutrient requirements during old age. |

**Text book**

1. Mahan,L.K &Arlin.M.T, “Krause’s Food,Nutrition and Diet Therapy”, 11th Edition, W.B. Saunder Company, London, (2000).
2. Selelstein. S. & Sharlin.J, “Life Cycle Nutrition”, Jones & Bartlett publications,(2008).
3. Begum. M. R, “A Textbook of Food, Nutrition & Dietetics”, 3rd edition, Sterling publications Pvt. Ltd., (2008).
4. Srilakshmi. B, “Nutrition Science”, 5th edition, New Age International Pvt.Ltd., (2008).
5. Mudambi S.R and Rajagopal M.V, “Fundamentals of foods and Nutrition”, 3rd edition, New Age International Pvt. Ltd., (1997).
6. Pasricha.S, “Some Therapeutic Diets”, 5th edition, National Institute of Nutrition,(2004).
7. ICMR-Nutritive value of Indian Foods, National Institute of Nutrition, Hyderabad, (1989).
8. Mudambi. S.R, Rao. S.M, & Rajagopal.M.V, “Food Science”, New Age International Pvt. Ltd. Publishers, New Delhi, (2007).

**Outcomes Mapping**

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|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | **2** |  |  |  |  |
| **CO2** |  | **2** |  |  |  |
| **CO3** |  |  | **2** |  |  |
| **CO4** |  |  |  | **2** |  |
| **CO5** |  |  |  |  | **2** |

**SKILL BASED SUBJECT - III**

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| **SEMESTER: V**  **PART: IV** | **22UGENS59**  **SENSORY EVALUATION OF FOOD** | **CREDIT:2**  **HOURS:2** |

**COURSE OBJECTIVES**

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| 1. Gain the knowledge on application of sensory testing in food product development and quality control |
| 1. Understand the source and variability of raw food material and their impact on food processing operations |
| 1. Learn to choose the right method of sensory test, panelist and sample handling to minimize bias |
| 1. Learn the principles of sensory evaluation in practical, real-world situations and 2. Acquire knowledge about type of scale. |

**Unit I: Sensory attribute and mechanism**

Sensory attribute perception - appearance (vision), odor/aroma/fragrance (olfaction), consistency and texture (touch and tactile), flavor (gustation, chemical and trigeminal), noise (hearing). Physiological factors - psychological factors - sensory threshold - detection and recognition threshold. Good sensory practice: laboratory requirement – preparation and sample serving – preparation of sensory panel.

**Unit II:Gustation**

Introduction and importance of gustation - Structure and physiology of taste organs: tongue, papillae, taste buds, salivary glands - Mechanism of taste perception - Chemical dimensions of basic tastes- sweet, salt, sour, bitter and umami - Factors affecting taste quality, reaction time, taste modification, absolute and recognition threshold - Taste measurement: Electronic Tongue - Taste abnormalities

**Unit III: Olfaction**

Introduction, definition and importance of odour and flavor - Anatomy of nose, physiology of odour perception - Mechanism of odour perception - Theories of odour classification, chemical specificity of odour - Odour measurement techniques – historical perspective and emphasis on recent techniquese-nose - Olfactory abnormalities

**Unit IV: Texture and Colour**

Introduction, definition and importance of texture - Phases of oral processing - Texture perception, receptors involved in texture perception - Rheology of foods - Texture classification - Texture measurement - basic rheological models, forces involved in texture measurement and recent advances in texture evaluation - Application of texture measurement in cereals, fruits and vegetables, dairy, meat and meat products Introduction and importance of colour - Dimensions of colour and attributes of colour; gloss etc. - Perception of colour.- Colour Measurement: Munsell colour system, CIE colour system, Hunter colour system - Colour abnormalities

**Unit V: Statistical principle in sensory testing**

Type of scale in sensory evaluation. Binomial distribution (excel spreadsheets). Chi-square and friedman test (SPSS). Analysis of variance (SPSS). Student t-Test (excel).

**Practicals**

* Training of sensory panel
* To perform recognition and sensitivity tests for four basic tastes
* To perform analytical and affective tests of sensory evaluation.
* Recognition tests for various food flavours
* Texture evaluation of various food samples- crispies/ cookies/ biscuits/ snack foods
* Measurement of colour by using Tintometer/ Hunter Colour Lab etc.
* Textural measurement of various food products using Texture Analyzer
* Preference tests
  + paired preference
  + hedonic ratin
  + food action rating
  + preference ranking
* Difference tests
  + simple difference paired comparison test
  + directional paired comparison test
  + triangle test
  + duo-trio test
* Descriptive test
  + descriptive ranking test
  + descriptive rating test
  + profiling one product using line scales, descriptive rating test
  + profiling two products using star diagrams
* Quality evaluation of various food stuffs - cereals, pulses, honey, jaggery, sugar
* Qualitative tests for hydrogenated fats, butter, ghee
* Sensory evaluation of beverages – wine, tea and coffee
* Sensory evaluation of milk and milk products
* Extraction of pigments from fruits and vegetables and study the effect of temperature and pH
* Visit to sensory laboratory
* Final examination

**COURSE OUTCOMES**

Upon successful completion of this course, student will be able to:

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| 1. Describe the characteristics and roles of sensory testing in food industry |
| 1. Describe sensory attributes on food product |
| 1. Describe the influence of physico-chemical and psychological factors on sensory testing to anticipate the kind of psychological errors in sensory testing |
| 1. Conduct sensory tests that comply with good sensory practices and demonstrate how to organize laboratory requirement, prepare and sample serving, and panel preparation 2. Gain knowledge in evaluating the quality of products to enhance the foreign export level. |

**Text Books**

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| 1. Rao E. S. (2013). Food Quality Evaluation, Variety Books. |
| 1. Amerine, Pangborn & Roessler (1965). Principles of Sensory Evaluation of food, Academic Press, London. |
| 1. Meilgard (1999). Sensory Evaluation Techniques, 3rd ed. CRC Press LLC, 1999 |

**Supplementary Readings**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 1. DeMan J. (2007). Principles of Food Chemistry, 3rd ed., Springer. 62 | | | | | |
| 1. Brannen and et al.,(1990)Food Additives, Marcel Dekker,New York,1990 | | | | | |
| 1. Pomeranz Y and Meloan CE (2002). Food Analysis-Theory and Practice, CBS Publishers and Distributors, New Delhi | | | | | |
| 1. Meilgard (1999). Sensory Evaluation Techniques, 3rd ed. CRC Press LLC, 1999. | | | | | |
| 1. Amerine, Pangborn & Roessler (1965). Principles of Sensory Evaluation of food, Academic Press, London.   **Outcomes Mapping** | | | | | |
|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | **3** |  |  |  |  |
| **CO2** |  | **2** |  |  |  |
| **CO3** |  |  | **2** |  |  |
| **CO4** |  |  |  | **2** |  |
| **CO5** |  |  |  |  | **3** |

**SEMESTER – VI**

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| **SEMESTER: VI**  **PART:III** | **22UNFDC61**  **THERAPEUTIC NUTRITION** | **CREDIT:4**  **HOURS/WEEK:5** |

**COURSE OBJECTIVES**

To enable students to

1. Knowledge to classify the principles of diet therapy and types of therapeutic diets.
2. Understand the concepts of food sensitivity and genetic disorder.
3. Outline the disease of liver, gall bladder and pancreas.
4. Assess the nutritional problems of community and effectively manage the
5. Nutritional needs of community.

**UNIT: I Concept of diet therapy**

Nutrition Care Process: Definition of MNT, Nutritional Assessment (ABCD), Nutritional Diagnosis ,Nutrition Intervention , Monitoring & Evaluation of Nutritional Care. Purpose and principle of therapeutic diets, modification of normal diet, classification of therapeutic diets. Different feeding techniques –enteral and parenteral feeding. Role of Dieticians in nutritional care.

**UNIT: I I Nutrition for Weight Management, Febrile Disorders and genetic diseases**

Assessment of obesity – BMI, Waist Hip-Ratios, Skin folds Thickness Etiology – Genetic Factors, Physiological Factors, Behavioral factors Metabolism in obesity – Basal Metabolism, Treatment – Dietary Management, Fad diets and their consequences Underweight – Etiology, Health hazards, Treatments. Nutrition during Febrile Disorders:

a) Classification of fevers b) Metabolism c) General Dietary Considerations

d) Acute & chronic fevers -Typhoid &Tuberculosis Diet in phenyl ketonuria, galactoseminea and fractosuria diseases

**UNIT III. Nutrition in Diseases of the Liver and Gall bladder**

Etiology, clinical symptoms and modification of diet in disease of Liver and Gall bladder.a) Hepatitis: Types, Etiology, Symptoms, Treatment b)Cirrhosis: Etiology, Clinical Symptoms, Treatment c)Hepatic Encephalopathy Etiology, Clinical Symptoms, TreatmentDiseases of the Gall Bladder: d) Cholecystitis   
e) Cholelithiasis f) Pancreatic Surgery - Causes and Dietary Management.

**Unit IV. Nutrition in Gastro Intestinal Disorders**

General Dietary Considerations for healthy gut Peptic Ulcer Disease – Etiology, Symptoms, Management Intestinal Diseases – Irritable Bowel Syndrome (IBS), Constipation, Diarrhea Diseases of the Small Intestine – Celiac Disease – Gluten Sensitive Enteropathy, TropicalSprue, Lactose Intolerance, Inflammatory Bowel Disease - Crohn’s Disease, Ulcerative Colitis.

**UNIT V - Diet in disease of the Kidney, cancer and COVID 19**

Etiological factors, Etiology and modification of diet in disease of the Kidney-Glomerulonephritis, Nephrosis ,Acute and Chronic Renal Failure ,Dialysis ,Urinary Calculi.Risk factors ,symptoms ,Nutritional problems of cancer therapy and modification of diet in cancer role of antioxidants in cancer. Stages of HIV Infections, Medical Nutritional Therapy, Symptoms and signs ofCOVID 19 and diet for the patients.

**COURSE OUTCOMES**

1. Gain knowledge on the role of diet therapy for various disease conditions
2. Compare and contrast the modification of diet in obesity and underweight.
3. Apply the knowledge in planning, preparation and distribution of therapeutic diets for various disease conditions
4. Enable to counselling related to the dietary management
5. Equip to become a dietitian on hospital industries.

**Text Books**

1. Antia, F.P, Clinical dietetics and Nutrition ,4th Edition, Oxford University Press, Delhi,2012.
2. Joshi, S.A, Nutrition and Dietetics,2nd edition, TATA McGraw Hill publications, New Delhi.2018.
3. Mahan,L.K.,Arlin.M.T.,Krause’s,Food,NutritionandDietTherapy,11thedition, W.B.Saunder Company, London ,2010..

**Supplementary Readings**

1. Raheena Begum, A Text Book of Foods, Nutrition and Dietetics, Sterling Publishers, New Delhi.
2. National Institute of Nutrition, Dietary Guidelines for Indians - A Manual, Hyderabad, 2005
3. Srilakshmi. B, Dietetics, 5th Edition, New Age International (P) Ltd, Publishers, Chennai, 2018

**Outcomes Mapping**

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|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | **3** |  |  |  |  |
| **CO2** |  | **2** |  |  |  |
| **CO3** |  |  | **3** |  |  |
| **CO4** |  |  |  | **3** |  |
| **CO5** |  |  |  |  | **2** |

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| **SEMESTER:VI**  **PART:III** | **22UNFDC62**  **FOOD PROCESSING AND PRESERVATION** | **CREDIT:4**  **HOURS/WEEK:5** |
| **COURSE OBJECTIVES**  To enable the students to:   1. Understand the principles of preservation. 2. Understand various types preservation by using high and low temperature. 3. Learn various types of preservation using chemicals and food irradiation. 4. Compare and contrast the drying and dehydration 5. Apply different techniques used in the preservation of foods.   **UNIT – I: Principles and importance of food preservation**  Principles and importance of food preservation, need for preservation, types of spoilage, role of microorganism in food spoilage, prevention of food spoilage, shelf life of food products, factors affecting shelf life.  **UNIT – II preservation by high and low temperature:**  Preservation by high temperature: blanching, pasteurization, sterilization and UHT processing, canning, extraction cooking, dielectric heating microwave heating, baking, roasting and frying. Retort processing of Ready To Eat (RTE) products.  Preservations by low temperature – refrigeration, freezing, dehydro freezing. Food irradiation  **UNIT – III preservation by drying**  Home drying, methods of dehydration, factors in the control of drying, treatment of foods before drying, procedures after drying, intermediate moisture foods, merits and demerits, factors affecting drying  preservation by drying, concentration and evaporation: various methods sun – drying, tray or tunnel drying, spray drying, drum drying freeze drying, fluidized bed drying. Advantages and disadvantages.  **UNIT - IV: Chemical preservatives**  Definition, classification, mode of action, mechanism. Properties and safety of irradiation, advantages, mechanism permitted doses.  **UNIT-V: Preservation by non – thermal methods**  Preservation by non – thermal methods: Use and application of enzymes and microorganism in processing and preservation by salt, sugar, chemicals smoking. Food additives: Definition, types and functions, permissible limits and safety aspec  **COURSE OUTCOMES**  Apply major food preservation techniques and principles   1. To know the various types of food preservation methods. 2. Acquire knowledge on high and low temperature methods of food preservation 3. Understanding of chemical preservation and fermentation 4. Identify non – thermal method of food preservation 5. Acquire knowledge food processing to enhance economic status of India   **Text Books**   1. 1.Gould .G.W (1995) New methods of food preservation. Blackie academic and professional. London. 2. Arthey, D and Ashurst, P.R (1996) Fruit processing, Blackie academic and professional. London. 3. Fellows, P.J (2016): Food Processing Technology: Principles and Practice, second edition, CRC Wood head publishing Ltd, Cambridge.   **Supplementary Readings**   1. ShakunthalaManay. N; ShadaksharaSwamy.M; Foods Facts and Principles, 3rd edition, New Age International (P) Limited Publishers, 2014. 2. Subbulakshmi. G and Shobha. A.U; Food processing and preservation, New Age International (P) Limited Publishers, 2014. 3. Sivasankar. B; Food Processing and Preservation, PHI Learning Private Limited, 2011.   **Outcomes Mapping**   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | | **CO1** | **3** |  |  |  |  | | **CO2** |  | **2** |  |  |  | | **CO3** |  |  | **2** |  |  | | **CO4** |  |  |  | **2** | **3** | | **CO5** |  |  |  |  | **3** |  |  |  |  | | --- | --- | --- | | **SEMESTER: IV**  **PART: III** | **22UNFDC63.FOOD SERVICE MANAGEMENT** | **CREDIT:4**  **HOURS/WEEK:5** |   **COURSE OBJECTIVE**  To enable the students to:   |  | | --- | | 1. Explain functioning of different types of food service institutions. | | 1. Able to understand the types of kitchen and kitchen layout | | 1. Understand the space allocation and arrangement of food service units. | | 1. Develop a skill on the concept of quantity food cookery | | 1. Skills in effective utilization of resource management in food service industry. |   **UNIT- I:**  **a) Food Service Industry:** Definition – types of catering- Hotel, Motel, Restaurant, and Cafeteria and chain hotels.  **b) Welfare catering**– Hospital, School lunch, Residential establishment and Industrial catering.  **c) Transport catering**– Air, Rail, Sea and Space, Miscellaneous – Contract and outdoor.  **UNIT – II: Physical Plant and Food Purchase**  a) Layout of kitchens, types of kitchens – Planning, Receiving and storage space of foods, table setting, Dishwashing.  b) Food Purchase- Procedures and Factors involved in the selection of food.  **UNIT – III:Quantity Food Service and Equipments**  **a) Quantity Food Service:** Definition, objectives, styles of service- waiter service, self – service, vending. Mechanics of waiter service.  **b) Equipment:** Classification, factors involved in selection, use and care of major equipments.  **UNIT – IV: Management**  a) Management- Definition, principles, Functions and tools of management, qualities of a good leader, styles of leadership.  b) Resource Management – Money, Time, Energy, Computer applications in food service institutions.  **UNIT – V:Personnel Management**  definition, development and policies, sources of Recruitment, selection induction, training, development, motivation and leadership. Financial management- Cost control- methods and factors affecting cost control. Bookkeeping- books of account and Break even analysis.  **COURSE OUTCOMES**   1. Establish a food service unit 2. Manage human resources and solve problems with remedial measures 3. Analyze and implement quality control in food service institution 4. Promote the product in the market 5. Understand the basic principles of management in food services units.   **Text Books (In API Style)**   |  | | --- | | 1. West,B.B. and Wood, L. 1979. Food Service in Institutions,John Wiley, New York. | | 1. Kinton.R And Ceserani,V. 1992.The Theory of Catering . ELBS Publishers. | | 1. Bennion, M and Hughes, D. 1975- Introductory foods, Macmillan publishing Co. Inc- New York. | | 1. T.Ramaswamy. Principles of Management Himalaya Publication. |   **Supplementary Readings**   * + - 1. Pechkam, G.C. 1979 – Foundations of food preparation. the Macmillan Publishing Co., New York.       2. Subba Rao, P. 2014 Management Theory and Practice, Himalaya publication       3. Swaminathan, M.1979, Food Service and Experimental Foods, Ganesh & Co., Madras.       4. Manay Shakunthala, N and Shadakshaiswamy, M 1987 – Foods, Fats& Principles. Willey Eastern Ltd. New Delhi, Bangalore. | | |
| **SEMESTER:VI**  **PART:III** | **22UNFDP64**  **DIETETICS PRACTICALS** | **CREDIT:3**  **HOURS/WEEK:5** |

**COURSE OBJECTIVE**

1. Understand foods to be included and food to be avoided for various disease
2. Relate various food items and diseases condition
3. Acquire knowledge about dietary department of the hospital

**PRACTICALS**

1. Planning diets for the following

* Clear fluid, full fluid and soft diet.
* Diet in febrile conditions- Typhoid, tuberculosis.
* Diet in atherosclerosis and hypertension.
* Diet in ulcer, diarrhoea and constipation.
* Diet in diabetes mellitus with and without insulin.
* Diet in HIV

2. Visit to the dietary department of hospital.

3. Dietary internship program for a month.

**COURSE OUTCOME**

The learners will be able to

1. Provide comprehensive knowledge on principles and planning of therapeutic diets.
2. Acquire knowledge on nutritional needs of normal and sick persons.
3. Assess the nutritional problems of community and effectively manage the nutritional needs of community.
4. Develop capacity and aptitude for taking up dietetics as a profession.
5. Acquire knowledge about dietary modification

**Text Book**

1. Antia F. P. Clinical Dietetics and Nutrition,2002 4th edition, Oxford university press.
2. Davidson and Passmore, Human Nutrition And Dietetics, Churchill Livingstone publication.
3. Sue Rodwell Williams , Basic Nutrition and Diet Theraphy, 2000 Mosby publication.
4. Garrow J.S, James W. P.T, (2000), Human Nutrition and Dietetics, 10th edition, Churchill Livingston, London.

**Supplementary Readings**

1. Guthrie H. A, Picciano M. F (1995), Human Nutrition, Mosby, St. Louis Missorie.
2. Mohan K. L, Krause M.V (2002), Food , nutrition and Diet Therapy, W.B.Saunders Co, Philadelphia.
3. Srilakshmi B, Dietetics (2006), New Age International Publishing Ltd.
4. Robinson C.H., Lawler M.R, Cheweth W.L; and Gaswick A.E, Normal and Therapeutic Nutrition ,17 th edition, Mac Milan Publishers.

**Outcomes Mapping**

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|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | **2** |  |  |  |  |
| **CO2** |  | **2** |  |  |  |
| **CO3** |  |  | **3** |  |  |
| **CO4** |  |  |  | **3** |  |
| **CO5** |  |  |  |  | **2** |

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| **SEMESTER: V**  **PART:III** | **22UNFDP65**  **THERAPEUTIC NUTRITION PRACTICALS** | **CREDIT: 4**  **HOURS/ WEEK:4** |

**COURSE OBJECTIVE**

1. Understand foods to be included and food to be avoided for various disease
2. Relate various food items and diseases condition

**PRACTICALS**

**1. Planning diets for the following**

* Diet in obesity and under weight.
* Diet in hepatitis and cirrhosis of liver.
* Diet in Nephritis and Nephrosis.
* Diet in phenyl ketonuria
* Diet in galactoseminea
* Diet in fractosuria
* Diet in gallbladder diseases
* Diet in cancer
* Diet in renal calculi
* Diet for COVID19

**2. Visit to the dietary department of hospital.**

**3. Dietary internship program for a month.**

**COURSE OUTCOME**

The learners will be able to

1. Provide comprehensive knowledge on principles and planning of therapeutic diets.
2. Acquire knowledge on nutritional needs of normal and sick persons.
3. Assess the nutritional problems of community and effectively manage the nutritional needs of community.
4. Develop capacity and aptitude for taking up dietetics as a profession.
5. Acquire knowledge about dietary department of the hospital

**Text Book**

1. Antia F. P. Clinical Dietetics and Nutrition,2002 4th edition, Oxford university press.
2. Davidson and Passmore, Human Nutrition And Dietetics, Churchill Livingstone publication.
3. Sue Rodwell Williams , Basic Nutrition and Diet Theraphy, 2000 Mosby publication.
4. Garrow J.S, James W. P.T, (2000), Human Nutrition and Dietetics, 10th edition, Churchill Livingston, London.

**Supplementary Readings**

1. Guthrie H. A, Picciano M. F (1995), Human Nutrition, Mosby, St. Louis Missorie.
2. Mohan K. L, Krause M.V (2002), Food , nutrition and Diet Therapy, W.B.Saunders Co, Philadelphia.
3. Srilakshmi B, Dietetics (2006), New Age International Publishing Ltd.
4. Robinson C.H., Lawler M.R, Cheweth W.L; and Gaswick A.E, Normal and Therapeutic Nutrition ,17 th edition, Mac Milan Publishers.

**Outcomes Mapping**

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| --- | --- | --- | --- | --- | --- |
|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | **2** |  |  |  |  |
| **CO2** |  | **2** |  |  |  |
| **CO3** |  |  | **3** |  |  |
| **CO4** |  |  |  | **3** |  |
| **CO5** |  |  |  |  | **2** |

**Internal Elective – IV**

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| **SEMESTER:VI**  **PART: III** | **22UNFDE66-1**  **HOSPITAL FOOD SERVICE ADMINISTRATION** | **CREDIT: 3**  **HOURS /WEEK: 4** |

**COURSE OBJECTIVES**

To enable the students to:

1. Define role of hospital food service administration.
2. Develop skills to maintain medical records.
3. Understand the management of resources in hospitals.
4. Design hospital diets and housekeeping department.
5. Knowledge about financial management.

**Unit I: Introduction to hospitals**

Hospital based health care and its changing scenario, Effects of globalization on health care, concepts of corporate hospitals in developing countries, infrastructure and lay out of an ideal corporate hospital, functioning of modern hospital and changing needs of patients.

**Unit II: Patient care services**

Patient Care Services, Patient Admission / discharge. Functioning of Outpatient -In patient -Emergency Services -Operation theatre -Intensive care - Superspecialty. Planning and schedule of work

**Unit III: Objectives functioning of Supportive Services**

Lab services -Radiology and Imaging services, Blood bank services, Pharmacyservices, diagnostic services, physiotherapy.Medical records services-Housekeeping- Laundry-Stores - Health Insurance

**Unit IV: Hospitality in hospital care**

Function, structure, organisation and management of Dietary Department. Diet planning for hospital diets. Purchasing, storage and quantity food production, patient compliance, food production, serving to patient- tray and trolley service, plate waste management, washing and garbage disposal

**Unit V: Management of Hospital services**

Importance of Marketing and Material management, Human resource management, managerial accounting and financial management, inventory management. Types of computer systems used for reservation systems, point of sale systems (POS) and property management systems. (PMS). Meaning and importance of Hospital audit.

**COURSE OUTCOMES**

1. Understand the functioning of hospitals
2. Manage the patient care and auxiliary and supportive care services.
3. Plan menu to satisfy the nutritional, dietary and medical needs of patients
4. Understand the functions of the management of hospital administration.
5. Gain knowledge on Hospital based healthcare and it changing scenario.

**Text Books**

1. Sudhir Andrews, Front Office Management and Operations, 2008, Tata Mc Graw - Hill Publishing Company Ltd.
2. Sakharka B M, Principles of Hospital Administration and Planning, 2009, 2nd Edition, Jaypee Brothers Medical Publishers (p) Ltd.
3. Sherry Glied and Peter Smith, The Oxford Handbook of Health Economics,2011

**Supplementary Reading**

1. Jan Abel Olsen, Principles in Health Economics and Policy, 2009, Oxford University Press.
2. Mohinder Chand, Managing Hospitality Operations, 2009, 1st Edition, Anmol Publications Pvt. Ltd. New Delhi.
3. Goel S.L, Health Care System and Hospital Administration, 2009, Vol.7, Deep and Deep Publications Pvt. Ltd.

**Outcomes Mapping**

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| --- | --- | --- | --- | --- | --- |
|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | **2** |  |  |  |  |
| **CO2** |  | **3** |  |  |  |
| **CO3** |  |  | **2** |  |  |
| **CO4** |  |  |  | **3** |  |
| **CO5** |  |  |  |  | **2** |

**INTERNAL ELECTIVE - IV**

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| **SEMESTER:VI**  **PART:III** | **22UNFDE66-2**  **NUTRITIONAL ASSESSMENT** | **CREDIT:3**  **HOURS /WEEEK:4** |

**COURSE OBJECTIVES**

1. To reduce a depth understanding of nutritional assessment
2. Acknowledge tools of nutrition screening
3. To help student gain knowledge about different kinds of nutrition assessment.
4. To inform about nutrition education and counseling.
5. To gain knowledge about biochemical assessment.

**UNIT I: Nutritional assessment.**

1. Introduction
2. Importance
3. Nutrition screening
4. Population to be priority in conduction and period of assessment.

**UNIT II: Anthropometry assessment**

1. Introduction
2. Weight, Height, BMI, MUAC measurement and Rules to be followed .

**UNIT III: Biochemical assessment**

1. Definition
2. Methods
3. Types of laboratory test
4. Interpretation of result
5. Practical application

**UNIT IV:Clinical assessment**

1. Physical signs and techniques of identification
2. Methods of assessment
3. Advantages and disadvantages

**UNIT IV:Dietary assessment and Food security assessment**

1. 24 hours recall
2. Food frequency questionnaire
3. Food group questionnaire
4. Food insecurity introduction
5. Food security assessment
6. Food availability, good access and for utilization/ consumption
7. Assessment technique
8. Program of food support provision
9. Vital health statistics.

**COURSE OUTCOME**

1. Acquire knowledge on symptoms of malnutrition to evaluate the personal and public health status
2. Gain knowledge on anthropometric assessment to determine the health status
3. Understand the normal value of various body fluid and components
4. Develop skills to evaluate the dietary practices by diet survey
5. Recognize the Malnutrition in the community and develop community based nutrition project.

**Text Books**

1. Textbook of Human nutrition- B Srilaxmi
2. Guide for screening for food and nutrition service among adolescents and adults with HIV.
3. Textbook of community nutrition – Salil sehgaland Rita S Raghuvanshi
4. Krause’s – Food and the nutrition care process – L kathleen Mahan and Janice L Raymond.

**SUPPLEMENTARY READING**

1. <https://www.open.edu> › oucontent
2. Nutrition Module: 5. Nutritional Assessment: View as single page
3. <https://www.sciencedirect.com> › topicsh
4. Nutrition Assessment - an overview | Science Direct Topics

**Outcomes Mapping**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | **3** |  |  |  |  |
| **CO2** |  | **2** |  |  |  |
| **CO3** |  |  | **2** |  |  |
| **CO4** |  |  |  | **3** |  |
| **CO5** |  |  |  |  | **3** |

|  |  |  |
| --- | --- | --- |
| **SEMESTER: V**  **PART: IE 9** | **22UNFDE66-3**  **BASICS IN RESEARCH METHODOLOGY** | **CREDIT: 3**  **HOURS: 3** |

**COURSE OBJECTIVES**

The learner will be able to

1. Carry out a small project
2. Develop skills in report writing.

**Unit I:**

**Research**- Meaning, types.

**Research problem** - Definition and selection of research problem.

**Unit II:**

Methods of data collection- Collection of primary and secondary data, selection of appropriate method for data collection

**Unit III:**

Measures of central tendency - Mean Median, Mode & Standard deviation.

**Unit IV:**

Coding and Tabulation of data

**Unit V:**

Report writing- steps in report writing,

**COURSE OUTCOMES**

1. Understand the procedure to carry out research
2. Evolve the ability to interpret and analyse the data.
3. Gain knowledge on different types of research
4. Understand various methods of data collection
5. Gain knowledge to get project from government sectors.

**Text Books**

1. Kothari, C.R. (2008). Research methodology methods and techniques, New Age International publishers, New Delhi.
2. Kumar, R. (2005) Research Methodology : A Step by Step Guide for Beginners.
3. Sage Publications, New Delhi.
4. Kerlinger F. N. and Lee, H.B. (2000) Foundations of Behavioural Research 4th Ed. Harcourt College Publishers.
5. Black, J.A. & Champion, D. J. ( 1976) Methods and Issues in Social Research. New York: John Wiley and Sons.

**Outcomes Mapping**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | **2** |  |  |  |  |
| **CO2** |  | **2** |  |  |  |
| **CO3** |  |  | **2** |  |  |
| **CO4** |  |  |  | **2** |  |
| **CO5** |  |  |  |  | **2** |

**SKILL BASED SUBJECT - IV**

|  |  |  |
| --- | --- | --- |
| **SEMESTER:VI**  **PART: IV** | **222UNFDS68: INTERNSHIP** | **CREDIT: 2**  **HOURS:2** |

**Internship:**

A phase of training where in a graduate is expected to conduct actual practice in a hospital or food industry for a period of 30 Days so as to acquire job oriented skills

**Assessment:**

Interns shall maintain a record book which shall be verified and certified by the training authority under whom he or she works during his/her internship period.

An objective evaluation of his/her knowledge, skills and attitude during training will be recorded by the center in-charge and monitored by faculty in-charge and marks shall be allotted accordingly.

Hospital or food industry authority - 75

Internal Assessment & Viva Voce - 25