MAHATMA GANDHI UNIVERSITY

PRIYADARSHINI HILLS,
KOTTAYAM - 686 560

CURRICULUM FOR BACHELOR’S PROGRAMME

IN

Clinical Nutrition & Dietetics

MODEL-3

Under Choice Based Credit System (CBCS)
(2017 Admissions Onwards)
INTRODUCTION

Nutrition plays a primary role in growth, development, health and fitness. Maintaining appropriate nutrition throughout life can prevent, or at least delay the onset of nutrition related diseases. Food is essential for our bodies to:

- Develop, replace and repair cells and tissues;
- Produce energy to keep warm, move and work;
- Carry out chemical processes such as the digestion of food;
- Protect against, resist and fight infection and recover from sickness.

The food or liquids affect our body and health because each food or liquid contain particular nutrients which is very necessary for our physical and mental growth. A particular level of any particular nutrient is essential for our body. So we should know that what food we have to take, how much and what type of nutrients are present in a particular food. The body cannot function properly if one or more nutrients are missing. A healthy and balanced diet provides foods in the right amounts and combinations that are safe and free from disease and harmful substances.

Whenever we take any food or nourishing liquids, our body digests and absorbs the simple but essential minerals, vitamins, fats, proteins, carbohydrates, fats and water from these food or nourishing liquids and converts it into the bloodstream and energy that help our body to grow and keep it healthy. The nutrition value is more important for any individual’s health. The food or liquids whenever we take it affect our body and health as well both. So it is very important that we should be more aware of the foods or liquids whatever we take in our daily life. A large number of diseases occur only due to wrong diet.

Prevention is better than cure. The earlier a person starts to eat a healthy and balanced diet, the more he or she will stay healthy. Once weight has been lost it may be difficult to regain it because of tiredness and lack of appetite.

The UG programme in Clinical Nutrition & Dietetics gives special attention to the clinical aspects. An integration of theory, practical, internship and community work aim at equipping the students the necessary proficiencies for a wide variety of careers.
AIMS AND OBJECTIVES

AIMS:

- Dietitians in hospitals
- Diet consultants in hotels, flight kitchens, railways and industrial canteens.
- Nutritionist in health clinics and food industries
- Member of teaching faculty in higher education
- Research assistants/ Associate in institutes undertaking research programmes in nutrition and health
- Project officers under different welfare programmes of governmental and non-governmental organizations
- Project officers in nutrition programmes FAO, WHO, UNICEF
- Freelance Registered Dietitians(RD)

OBJECTIVES

- To impart knowledge and develop capacities of the students in the area of Clinical Nutrition.
- To develop students to become health care professionals for services in various fields of clinical nutrition and related areas such as hospitals, academics, research, industry, community service.
- To enable them to pursue higher education and research in Clinical Nutrition and Food Science.
## CONSOLIDATED SCHEME

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Type</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Hrs/wk</th>
<th>Credit</th>
<th>External</th>
<th>Internal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Common</td>
<td>CN1CRT01</td>
<td>Basic Nutrition</td>
<td>4</td>
<td>4</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Core Theory</td>
<td>CN1CRT02</td>
<td>Basic Dietetics</td>
<td>4</td>
<td>3</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Core Theory</td>
<td>CN1CRT03</td>
<td>Family Meal Management I</td>
<td>4</td>
<td>3</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Complementary</td>
<td>CN1CMT01</td>
<td>Fundamentals of Biochemistry</td>
<td>4</td>
<td>3</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Theory</td>
<td>CN1CMT02</td>
<td>Human Anatomy and Physiology I</td>
<td>4</td>
<td>3</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td></td>
<td>5</td>
<td>4</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Total</strong></td>
<td><strong>25</strong></td>
<td><strong>20</strong></td>
<td><strong>480</strong></td>
<td><strong>120</strong></td>
</tr>
<tr>
<td>2</td>
<td>Common</td>
<td>CN2CRT04</td>
<td>Advanced Nutrition</td>
<td>4</td>
<td>4</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Core Theory</td>
<td>CN2CRT05</td>
<td>Clinical Nutrition</td>
<td>4</td>
<td>3</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Core Theory</td>
<td>CN2CRT06</td>
<td>Family Meal Management II</td>
<td>4</td>
<td>3</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Complementary</td>
<td>CN2CMT03</td>
<td>General Biochemistry</td>
<td>2</td>
<td>2</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Theory</td>
<td>CN2CMT04</td>
<td>Human Anatomy and Physiology II</td>
<td>2</td>
<td>2</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Complementary</td>
<td>CN2CMT05</td>
<td>Biochemistry Practical- I</td>
<td>2</td>
<td>1</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Practical</td>
<td>CN2CMT06</td>
<td>Human Physiology Practical- I</td>
<td>2</td>
<td>1</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Field Study</td>
<td>-</td>
<td>Field/Industrial visits</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td><strong>Total</strong></td>
<td><strong>25</strong></td>
<td><strong>20</strong></td>
<td><strong>640</strong></td>
<td><strong>160</strong></td>
</tr>
<tr>
<td>3</td>
<td>Core Theory</td>
<td>CN3CRT07</td>
<td>Therapeutic Nutrition</td>
<td>4</td>
<td>3</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Core Theory</td>
<td>CN3CRT08</td>
<td>Food Commodities I</td>
<td>4</td>
<td>3</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Core Theory</td>
<td>CN3CRT09</td>
<td>Community Nutrition</td>
<td>4</td>
<td>3</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Core Practical</td>
<td>CN3CRP01</td>
<td>Therapeutic Nutrition I</td>
<td>1</td>
<td>1</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Core Practical</td>
<td>CN3CRP02</td>
<td>Community Nutrition</td>
<td>2</td>
<td>2</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Complementary</td>
<td>CN3CMT05</td>
<td>Nutritional Biochemistry</td>
<td>5</td>
<td>4</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Theory</td>
<td>CN3CMT06</td>
<td>Human Anatomy &amp; Physiology III</td>
<td>5</td>
<td>4</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td><strong>Total</strong></td>
<td><strong>25</strong></td>
<td><strong>20</strong></td>
<td><strong>560</strong></td>
<td><strong>140</strong></td>
</tr>
<tr>
<td>Semester</td>
<td>Course Type</td>
<td>Course Code</td>
<td>Course Title</td>
<td>Hrs/wk</td>
<td>Credit</td>
<td>External</td>
<td>Internal</td>
</tr>
<tr>
<td>----------</td>
<td>-------------</td>
<td>-------------</td>
<td>---------------------------------------------------</td>
<td>--------</td>
<td>--------</td>
<td>----------</td>
<td>----------</td>
</tr>
<tr>
<td>4</td>
<td>Core Theory</td>
<td>CN4CRT10</td>
<td>General Microbiology</td>
<td>4</td>
<td>4</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Core Theory</td>
<td>CN4CRT11</td>
<td>Food Commodities II</td>
<td>4</td>
<td>4</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Core Practical</td>
<td>CN4CRP03</td>
<td>Therapeutic Nutrition Practical II</td>
<td>3</td>
<td>3</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Core Practical</td>
<td>CN4CRP04</td>
<td>Quantity Food Production Practical</td>
<td>2</td>
<td>1</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Complementary Theory</td>
<td>CN4CMT07</td>
<td>Biochemical Aspects of Nutrition</td>
<td>3</td>
<td>2</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Complementary Practical</td>
<td>CN4CMP03</td>
<td>Biochemistry Practical- II</td>
<td>2</td>
<td>1</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Complementary Theory</td>
<td>CN4CMT08</td>
<td>Human Anatomy &amp; Physiology IV</td>
<td>3</td>
<td>2</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Complementary Practical</td>
<td>CN4CMP04</td>
<td>Human Physiology Practical- II</td>
<td>2</td>
<td>1</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Core Theory</td>
<td>CN5CRT12</td>
<td>Food Microbiology Sanitation and Hygiene</td>
<td>5</td>
<td>3</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Core Theory</td>
<td>CN5CRT13</td>
<td>Personnel Management</td>
<td>3</td>
<td>3</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Core Theory</td>
<td>CN5CRT14</td>
<td>Research Methodology and Statistics</td>
<td>5</td>
<td>4</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Core Theory</td>
<td>CN5CRT15</td>
<td>Human Rights &amp; Environmental Studies</td>
<td>5</td>
<td>4</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Open Course</td>
<td>CN5OPT16</td>
<td>Food Fortification</td>
<td>5</td>
<td>4</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Core Practical</td>
<td>CN5CRP05</td>
<td>Food Science Practical</td>
<td>2</td>
<td>2</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Core Theory</td>
<td>CN6CRT17</td>
<td>Food Safety</td>
<td>4</td>
<td>3</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Core Theory</td>
<td>CN6CRT18</td>
<td>Food Adulteration</td>
<td>4</td>
<td>3</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Core Theory</td>
<td>CN6CRT19</td>
<td>Preventive Nutrition</td>
<td>4</td>
<td>3</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Core Theory</td>
<td>CN6CRT20</td>
<td>Food Service Management</td>
<td>4</td>
<td>3</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Optional Core</td>
<td>CN6OCT21</td>
<td>Food Preservation Epidemiology Information Technology</td>
<td>3</td>
<td>3</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Core Practical</td>
<td>CN6CRP06</td>
<td>Meal Management Practical</td>
<td>4</td>
<td>2</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Project</td>
<td>CN6PRP07</td>
<td>Project</td>
<td>2</td>
<td>2</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>On the Job Training</td>
<td>CN6OJP08</td>
<td>On The Job Training</td>
<td>1</td>
<td>-</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td></td>
<td>25</td>
<td>20</td>
<td>640</td>
<td>160</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Type</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Hrs/wk</th>
<th>Credit</th>
<th>External</th>
<th>Internal</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Core Theory</td>
<td>CN5CRT17</td>
<td>Food Safety</td>
<td>4</td>
<td>3</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Core Theory</td>
<td>CN5CRT18</td>
<td>Food Adulteration</td>
<td>4</td>
<td>3</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Core Theory</td>
<td>CN5CRT19</td>
<td>Preventive Nutrition</td>
<td>4</td>
<td>3</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Core Theory</td>
<td>CN5CRT20</td>
<td>Food Service Management</td>
<td>4</td>
<td>3</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Core Theory</td>
<td>CN6CRT17</td>
<td>Food Safety</td>
<td>4</td>
<td>3</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Core Theory</td>
<td>CN6CRT18</td>
<td>Food Adulteration</td>
<td>4</td>
<td>3</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Core Theory</td>
<td>CN6CRT19</td>
<td>Preventive Nutrition</td>
<td>4</td>
<td>3</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Core Theory</td>
<td>CN6CRT20</td>
<td>Food Service Management</td>
<td>4</td>
<td>3</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Optional Core</td>
<td>CN6OCT21</td>
<td>Food Preservation Epidemiology Information Technology</td>
<td>3</td>
<td>3</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Core Practical</td>
<td>CN6CRP06</td>
<td>Meal Management Practical</td>
<td>4</td>
<td>2</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Project</td>
<td>CN6PRP07</td>
<td>Project</td>
<td>2</td>
<td>2</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>On the Job Training</td>
<td>CN6OJP08</td>
<td>On The Job Training</td>
<td>1</td>
<td>-</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td></td>
<td>25</td>
<td>20</td>
<td>480</td>
<td>120</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Type</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Hrs/wk</th>
<th>Credit</th>
<th>External</th>
<th>Internal</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Core Theory</td>
<td>CN6CRT17</td>
<td>Food Safety</td>
<td>4</td>
<td>3</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Core Theory</td>
<td>CN6CRT18</td>
<td>Food Adulteration</td>
<td>4</td>
<td>3</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Core Theory</td>
<td>CN6CRT19</td>
<td>Preventive Nutrition</td>
<td>4</td>
<td>3</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Core Theory</td>
<td>CN6CRT20</td>
<td>Food Service Management</td>
<td>4</td>
<td>3</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Optional Core</td>
<td>CN6OCT21</td>
<td>Food Preservation Epidemiology Information Technology</td>
<td>3</td>
<td>3</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Core Practical</td>
<td>CN6CRP06</td>
<td>Meal Management Practical</td>
<td>4</td>
<td>2</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Project</td>
<td>CN6PRP07</td>
<td>Project</td>
<td>2</td>
<td>2</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>On the Job Training</td>
<td>CN6OJP08</td>
<td>On The Job Training</td>
<td>1</td>
<td>-</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td></td>
<td>25</td>
<td>20</td>
<td>560</td>
<td>240</td>
</tr>
</tbody>
</table>
SEMESTER I
BASIC NUTRITION

CORE
Credit: 4

CN1CRT01
Hours/week: 4

Objectives

To enable the students to:

To understand the relation between nutrition and health.
To acquire knowledge about the main nutrients and its functions in the body.
To understand the modifications in nutrient and dietary requirement for various diseases.

Module I
Introduction to Nutrition: Health, Food, Functions of food, Nutrients, Nutrition, Scope of nutrition, Basic four food groups, Food Pyramid, My Plate, Nutritional status, Visible symptoms of good health, Malnutrition.

Module II
Carbohydrates: Composition, Classification, functions, Sources, digestion, absorption and transport. Components of dietary fibre, Role of fiber in health and disease.
Protein: Composition, classification, functions, sources, requirements, digestion, absorption and transport, protein quality evaluation.
Lipids: Composition, Classification, functions, sources, requirements, digestion, absorption and transport.

Module III
Water and Electrolytes: Water, Sodium, Potassium: Distribution of water and Electrolytes, Functions, Sources, Requirements, Sodium - Potassium balance, Mechanism of Water Regulation, Water intoxication and dehydration, Water and electrolyte balance

Module IV
Energy: Unit of energy, sources, determination of energy expenditure, energy value of foods, Measurement of total energy requirement, Resting energy expenditure, Physical Activity Level (PAL), Factors affecting PAL, Basal Metabolic Rate, determination of BMR, SDA.
Suggested Readings


Indian Council of Medical Research (2010), Nutrient Requirements and RDA for Indians, ICMR.
SEMESTER I
BASIC DIETETICS

CORE
Credit: 3

Objectives
To enable the students to-
   To impart basic knowledge in the field of dietetics.
   To develop capacity and aptitude for taking up dietetics as a profession.

Module I
Dietitian and diet counseling: Role of Dietitian, specializations of dietitian, Nutrition and diet clinic, Patient check up and Nutrition counseling- directive and non directive, Strategies and goals of counseling and follow up. Psychology of feeding the patient.
Computer application: use of computers by Dietitian, Dietary computations, Dietetic management, education/training.

Module II
Basic concepts of Diet Therapy: Routine hospital diets - regular diets, clear fluid diet, full fluid diet, soft diet, Modified diets, Enteral and parenteral nutrition, Refeeding syndrome.
Diet in Infections and Fevers: Types, Aetiology, Metabolic changes, Dietary considerations in Typhoid, Influenza, Malaria, Tuberculosis, AIDS.

Module III
Diet during eating disorders- anorexia, bulimia, binge eating.

Module IV
Diet in Food Allergy and food intolerance (hypersensitivity): Definition, etiology, food allergens, symptoms and diagnosis of food allergies, nutritional management, restricted diets, elimination diets and hypo-sensitization, prevention of adverse food reaction. Skin disturbances: Types, symptoms, Diagnosis and Treatment.
Drug-Nutrient interactions (in brief)
Suggested Readings

Srilakshmi B, Dietetics (2006), New Age International Publishing Ltd.
SEMMESTER I
FAMILY MEAL MANAGEMENT I

CORE
Credit: 3

CNICRT03
Hours/week : 4

Objectives
To enable students to:

Learn the principles of meal planning.
Acquire knowledge on planning meals for different age groups.

Module I
Menu Planning: Balanced Diet, Food groups, Food guide, food pyramid, My Plate, Low cost balanced diets RDA, Basic principles of menu planning, Points to be considered while planning menu.

Module II
Nutrition in pregnancy: Physiological changes, Relationship between maternal and foetal nutrition, Impact of nutritional deficiency on the outcome of pregnancy, Nutritional and food requirements, Dietary guidelines, Dietary problems, Complications of pregnancy, GDM.

Module III

Module IV
Nutrition during Infancy: Growth & development, LBW, Small for Gestational Age and Pre term baby, Nutritional requirements, Artificial feeding, Hazards of Bottle feeding, Feeding of the Preterm and LBW babies, Weaning, Feeding problems in weaning, Family Pot Feeding, Low cost supplementary foods, ARF.
Suggested Readings


Objectives
To enable the students to:
   Understand knowledge about bimolecular which are the basics of life
   Study about energy currency of the cell and chemical messengers

Module I
Introduction to Biochemistry: Definition, Scope of biochemistry, Concept of equilibrium - Acids and bases, buffers, molarity, molality, normality, equilibrium, viscosity, surface tension, adsorption, acidosis, alkalosis.

Module II
Biological Oxidation: High energy compounds, Electron transport chain, ATP synthesis, ATP as currency of energy, substrate level phosphorylation, non-oxidative phosphorylation, oxidative phosphorylation - mechanism, inhibitors involved in oxidative phosphorylation, OR-potential.

Module III
Nucleic acids: Composition, functions, classification and structure of DNA and RNA. Nucleotide synthesis, DNA replication, Enzymes involved in DNA replication, DNA repair, Recombinant DNA technology, Protein synthesis, Genetic code, Gene mapping, Gene expression, operon concept, Lac, genotype and phenotype, epigenetics, Alleles, Epistasis.

Module IV
Suggested readings

Satyanarayana, U (2005), Biochemistry, Uppala Author- Publisher Interlinks Vijayavada.


SEMESTER I

HUMAN ANATOMY AND PHYSIOLOGY I

COMPLEMENTARY
Credit: 3

CN1CMT02
Hours/week : 4

Objectives
To enable the students to-

- Understand the general structure and functions of various systems and organs of the body.
- Understand the abnormal changes in the tissue and organs on several disease states.

Module I
Composition of the human body: Cell, cell organelles, tissues, organs, organ systems: digestive, excretory, respiratory, nervous, endocrine, circulatory, muscular, skeletal and reproductive systems. Cell junctions, Cell signaling, body fluids: ECF and ICF

Module II

Module III

Module IV
Suggested Readings:

Chatterjee, C.C. (2005), Human Physiology, Volume I & II Medical Allied
Agency, 82/1, Mahatma Gandhi Road, Kolkata – 700009.

Asia LTD Singapore

Hole, J.W (1989), Essentials of Human Anatomy and Physiology, 3rd edition,
WCB publishers, Dubuque, Iowa.

Human Physiology, S. chand and Co. Ltd, Ramnagar, New Delhi – 110055.

Wilson, K.J. and Waugh, A. (1999), Ross and Wilson Anatomy and Physiology in
health and illness.

Publishers and Distributors, New Delhi.

Indu Khurana and Arushi (2009), Text Book of Anatomy and Physiology for
Health Professionals, CBS Publishers and Distributors, New Delhi.

Guyton A.C(1991), Textbook of Medical Physiology, 8th,
Philadelphia: W B Saunders

RatanVidya, (2004), Handbook of Human Physiology, 7th Edition
(Reprint), Jaypee Bros Medical Publishers (P) Ltd, New Delhi
SEMESTER II
ADVANCED NUTRITION

CORE
Credit: 4

CN2CRT04
Hours/week: 4

Objectives
To enable the students -
To understand the relation between nutrition and health.
To acquire knowledge about the main nutrients and its functions in the body.

Module I
Macrominerals: Calcium, Phosphorus, Magnesium - Functions, sources, requirements, factors affecting absorption and utilization, Deficiency and Toxicity. Calcium – Phosphorus ratio.

Module II
Microminerals: Iron, Zinc, Copper, Selenium, Chromium, Iodine, Manganese, Molybdenum and Fluorine- Functions, sources, requirements, factors affecting absorption and utilization, deficiency and toxicity.

Module III
Fat Soluble Vitamins:- Functions, sources, requirements, factors affecting absorption and utilization, deficiency, toxicity of vitamin A, D, E, K , conversion factor of vitamin A and D.

Module IV
Water Soluble Vitamins: Functions, sources, requirements, factors affecting absorption and utilization, deficiency and toxicity of Thiamin, Riboflavin, Niacin, vitamin B6, Vitamin B12, Biotin, Pantothenic acid, Folic acid and Vitamin C.
Suggested Readings


Swaminathan M. (1974), Advanced Text Book On Food and Nutrition, Volume 1


Indian Council of Medical Research (2010), Nutrient Requirements and RDA for Indians, ICMR.
SEMESTER II

CLINICAL NUTRITION

CORE
Credit: 3

CN2CRT05
Hours/week: 4

Objectives

To enable the students to:

Study the aetiology, symptoms and medical nutrition therapy in various diseases

Learn how to plan and prepare diet for various diseases.

Module I


Module II

Diet in Diabetes Mellitus: Types, Aetiology, Symptoms, factors affecting normal blood sugar level, Diagnosis, Treatment, Dietary modifications, food exchange system, Glycemic Index, Glycemic load, Complications of diabetes, Nutrition in complication of diabetes, hypoglycemic agents and supportive therapy.

Module III

Medical Nutrition Therapy in Critical Care:
Surgery- Physiological response and dietary management.
Burns – Classification, complications, dietary management, mode of feeding and nutrition support.
Trauma and Injury- physiological, metabolic and hormonal responses to injury, dietary management of trauma.
Sepsis- systemic, metabolic and catabolic responses, Systemic Inflammatory Response Syndrome(SIRS), Multiple Organ Dysfunction Syndrome(MODS), Dietary Management.

Module IV

Diet in Gout: aetiopathology, clinical features, complications and dietary management.
Diet in Inborn Errors of Metabolism : Phenylketonuria, Maple Syrup Urine Disease (MSUD), Tyrosinemia, Homocystinuria, Galactosemia.
Suggested Readings


SEMESTER II
FAMILY MEAL MANAGEMENT II

CORE                  CN2CRT06
Credit: 3              Hours/week: 4

Objectives

To enable students to:

Learn the principles of meal planning.
Acquire knowledge on planning meals for different age groups.

Module I
Nutrition during early childhood (Toddler/Preschool): Growth and nutrient needs, Food requirements, Dietary guidelines, Feeding problems, Nutrition related problems, Growth monitoring, Importance of growth charts, GOBIFFF.

Module II
Nutrition of school children: Nutritional and food requirements, Dietary guidelines, Importance of breakfast, Feeding problems, Packed lunch, School lunch programmes

Module III
Nutrition during adolescence: Growth and nutrient needs, Food requirements, Food habits and dietary guidelines, Nutritional problems, Nutritional programmes for adolescence.

Module IV
Nutrition during adulthood – Reference man, Reference woman, Nutritional requirements, feeding pattern.
Geriatric nutrition: Process of ageing, Factors affecting food intake and nutrient use, Change in organ function with ageing, Nutrient needs, Nutrition related problems.
Suggested Readings


SEMESTER II
GENERAL BIOCHEMISTRY

COMPLEMENTARY
Credit: 2

CN2CMT03
Hours/week : 2

Objectives:
To enable students to:
   6. Acquire knowledge about the importance of environmental biochemistry.
   7. Understand the basis of genetic engineering.

Module I
Environmental biochemistry - Applications of radioactive isotopes, health hazards of artificial fertilizers and pesticides, pesticide residue, significance of biofertilizers and bioplastics. Recycling codes of plastics.

Module II
Introduction to genetic engineering- Gene cloning, host cells, vectors, bacteriophages, cosmids, restriction endonuclease, DNA ligases. Applications of genetic engineering.

Module III
DNA in the diagnosis of infectious diseases - tuberculosis, malaria, AIDS, CHAGAS disease, Human Papilloma Virus, lyme disease, periodontal disease.


Artificial chromosomes, Gene knockout, Gene silencing, Bioethics

Module IV
Basic techniques in genetic engineering - electrophoresis, blotting techniques, DNA sequencing, Polymerase Chain Reaction (techniques and applications) DNA analysis for environmental monitoring, DNA finger printing or DNA profiling, FISH techniques.
Suggested readings

Satyanarayana.U (2005), Biochemistry, Uppala Author-Publisher Interlinks, Vijayavada.


Objective:
To enable the students to get practical experience in lab and clinical nutrition.

Module I

Principles and applications and methodology of colourimetry.

Module II

Qualitative analysis of Sugars
   Glucose
   Fructose
   Maltose
   Lactose

Module III

Estimation urinary creatinine
Estimation of urinary urea

Module IV

a) Estimation of urinary calcium
b) Estimation of urinary Phosphorous
c) Estimation of urinary Ascorbic Acid
Suggested readings

Satyanarayana. U (2005), Biochemistry, Books and Allied Publishing LTD.
COMPLEMENTARY
Credit: 2

Objectives
To enable the students to-

- Understand the general structure and functions of various systems and organs of the body.
- Understand the abnormal changes in tissue and organs on several disease states.

Module I
Cardiovascular System
Structure of heart, conducting system of heart, cardiac cycle, Blood –functions, composition, blood clotting, blood groups, blood vessels-artery, vein capillaries, blood circulation-greater, lesser.

Module II
Lymphatic System
Tissue fluid, Lymph, Functions, formation of Lymph, lymph glands - structure and functions, lymphoid organs in the body.

Module III
Immune System
AMI and CMI, Innate and Acquired, Antigens and Antibodies, Helper T cells and Cytokines.

Module IV
Respiratory system
Organs of respiration – structure and functions, volume and capacity of lungs, mechanism of respiration, Artificial respiration, Compliance of lung and chest wall, cell respiration.
Suggested Readings:


Chatterjee, C.C. (2005), Human Physiology, Vol I & II Medical Allied Agency, 82/1, Mahatma Gandhi Road, Kolkata – 700009.


Jaypee Bros Medical Publishers (P) Ltd, New Delhi


Objectives
To enable the students to
  Identify and analyses body cells and fluids.
To gain technical skill in physical examination of body.

Module I
Microscopic examination of prepared slides - examines and draws the tissues
  Squamous, ciliated and columnar epithelia.
  Bone and cartilage
  Smooth, cardiac and striated muscle
  Nerve cell
  Skin

Module II
Physical examination of body
  a) Pulse rate at rest and after exercise
  b) Determination of arterial blood pressure
  c) Measurement of body temperature and diurnal rhythm.

Module III
Examine the model: identify and draw
  a) Section of human heart
  b) Section of human kidney
  c) Histology of artery and vein

Module IV
Hematology
  a) Enumeration of RBC of human blood
  b) Enumeration of WBC of human blood
  c) Haematocrit (PCV) and hemoglobin
  d) Mean Corpuscular Hemoglobin (MCH) and Mean Corpuscular Volume (MCV)
  e) Mean Corpuscular Hemoglobin Concentration (MCHC)
  f) Colour Index (CI)
Suggested Readings

OBJECTIVES

To enable the students to:

δ) To understand skills and techniques in the planning of therapeutic diet for various diseases and nutritional deficiencies.
ε) To gain knowledge in diet counseling and educating patients.

Module I
Diet in Cardiovascular diseases: Aetiology, Symptoms, Risk factors, pathophysiology, dietary management and prevention of Atherosclerosis, Coronary Artery Disease, Myocardial Infarction, Ischemic Heart Disease, Rheumatic Heart Disease (RHD), Congestive Cardiac Failure (CCF), Hypercholesterolemia, Hypertension – classification, sodium restricted diet, dangers of severe sodium restriction.

Module II
Diet in Diseases of Liver and Gall Bladder: Aetiology, Symptoms, Dietary treatment in Jaundice, Hepatitis, Pancreatitis, Cirrhosis, Hepatic Coma. Role of food and alcohol in developing liver diseases.
Biliary Tract Diseases- Cholecystitis Cholelithiasis and Choledocholithiasis.

Module III
Diet in Renal disease: Causes, Symptoms and dietary management in Nephritis, Nephrosis, Acute and chronic renal failure, Renal calculi, Acid and alkali producing foods, End Stage Renal Diseases (ESRD), Dialysis.

Module IV
Diet in Cancer: Tumor markers and their applications, Types of cancer, Risk factors, Symptoms, Metabolic alterations and Nutritional problems of cancer and cancer therapy, Medical Nutrition Therapy, Role of food in prevention of cancer.
**Suggested Reading**


SEMESTER III

FOOD COMMODITIES I

CORE
Credit: 3

CN3CRT08
Hours/week: 4

Objectives

To enable the students to:

To understand the raw and processed food commodities used in daily life.
To discuss the qualities of available commodities and their suitability for different purposes.

Module I
Introduction to Food science: Objectives of cooking, Preliminary preparations, Cooking methods – Moist heat methods, Dry heat methods, Microwave cooking, Solar cooking.

Module II
Cereals and Pulses: Composition, Nutritive value and processing of wheat, rice, barley, rye, oats, millets and its products, convenient cereal products. Cereal cookery: Gluten formation, Gelatinization and dextrinisation. Pluses: Composition and nutritive value, Digestibility of pulses, Processing, Toxic constituents, Pulse cookery.

Module III
Nuts and Oil seeds: Composition and Nutritive value, Specific nuts and oilseeds, Toxic constituents.
Fats and Oils: Composition and Nutritive value, Specific fats and oils, Refining and processing of edible oils, storage, Emulsions, Rancidity, Smoking point and Flash point.

Module IV
Vegetables and Fruits: Vegetables - Composition and Nutritive value, Pigments, Selection and Storage, Vegetable cookery.
Fruits - Composition and nutritive value, selection, post harvest changes and storage, ripening of fruits, Enzymatic and non enzymatic browning.
Suggested Readings


SEMMESTER III

COMMUNITY NUTRITION

CORE
Credit: 3

CN3CRT09
Hours/week :4

Objectives

To enable the students:

To understand the importance of nutrition in national progress and the significance of the assessment of nutritional status.
To find solutions to overcome problems of malnutrition in the community.

Module I
Introduction to nutrition and health in national development. Nutritional problems existing in our country - causes and preventive measures - PEM, VAD, IDA, IDD, VDD, Relationship between nutrition and infection.
Food Fortification: Needs, objectives, advantages, limitations. Restoration and enrichment

Module II
Methods of assessment of nutritional status: Direct assessment and indirect assessment. Significance of nutritional assessment of community, improvement of nutrition of community, Importance of Antenatal and post natal care.

Module III
Nutrition Education: Meaning, Importance, Principles of planning, Executing and evaluating nutrition education programs, Problems encountered in nutrition education.
Nutrition intervention schemes in the community: Lecture method demonstrations, nutrition exhibitions and visual aids.

Module IV
National and International Agencies and intervention programs in Community Nutrition: FAO, WHO, UNICEF, ICDS, NIN, CFTRI, CARE, ICMR, ANP, SNP, mid day meal program.
Suggested Reading


SEMESTER III
THERAPEUTIC NUTRITION PRACTICAL - I

CORE
Credit: 1

CN3CRP01
Hours/week: 1

Objectives

To emphasis skill development in planning therapeutic diets using food exchange lists.
To provide greater exposure to dietetic practices followed in Indian hospital.

Module I

Planning of routine hospital diet:

1. Clear fluid diet
2. Full fluid diet
3. Soft diet
4. High calorie and low calorie diet
5. High residue and low residue diet

Module II

Planning of diet in infectious diseases:

a) Typhoid
b) Tuberculosis

Module III

Planning of diet in cancer, surgery and burns

Module IV

Planning of diet in deficiency diseases:

b) Vitamin A deficiency
c) Calcium deficiency
d) PEM
Suggested Readings


Objectives
To enable the students to:

Develop skills in field application of the techniques of assessing nutritional status.
Acquire skills in organizing and implementing community nutrition projects.

Module I
Methods for assessment of nutritional status: direct and indirect parameters

Module II
Nutritional assessment of various age groups
  - Preschool children
  - School children
  - Adolescents
  - Adults
  - Elderly

Module III
Nutrition education
Prepare ten visual aids and provide nutrition education to different age groups in community

Module IV
Observation reports on
  - Noon meal programme
  - Anganwadi visit
  - Visit to star hotel
Suggested Reading


Objectives

To enable the students to-

Gain an understanding of the application of biochemistry in foods, nutrition and diet therapy.

Know the different metabolic pathways of macronutrients in human body

Module I

Carbohydrate Metabolism: Basic structure, Metabolism of glucose (glycolysis), fructose and galactose; Metabolism of pyruvate and lactate; Metabolism of acetyl Co A (TCA cycle); energetic of glucose metabolism, Synthesis of ribose (HMP Shunt); Synthesis of glucose from noncarbohydrates (gluconeogenesis); Metabolism of Glycogen- Glycogenesis and Glycogenolysis.

Module II

Lipid metabolism: Basic structure, Metabolism of Triacylglycerol, synthesis of fatty acid-saturated and unsaturated; Beta-oxidation of fatty acid-; Metabolism of Cholesterol; Metabolism of Ketone bodies

Module III

Protein metabolism: Basic structure of protein and amino acids; General pathways of aminoacid metabolism -Deamination, transamination, decarboxylation, and demethylation; urea cycle and fate of ammonia.

Module IV

Integration of metabolic pathways of energy metabolism, Metabolism in diabetes, obesity, starvation.

Regulation of metabolism: Interrelationship of carbohydrate, protein and lipid metabolism.

Metabolic adaptation during starvation, exercise, stress and diabetes mellitus.
Suggested readings

Satyanarayana.U (2005), Biochemistry, Uppala Author-Publisher Interlinks, Vijayavada, A.


SEMESTER III
HUMAN ANATOMY AND PHYSIOLOGY III

COMPLEMENTARY
Credit: 4

Objectives
To enable the students to:

α) Understand the general structure and functions of various systems and organs of the body.

β) Understand the abnormal changes in the tissue and organs on several disease states.

Module I
Endocrine System
Endocrine glands: structure and functions of Pituitary, Thyroid, Parathyroid, Adrenal, Pancreas, Placenta, Ovary, Testes, Thymus and Pineal body. Disorders of over and under secretions.

Module II
Reproductive system
Male and Female reproductive organs: structure and functions, reproductive hormones, Menstruation, Puberty, menopause, fertilization, development of fertilized ovum, placenta and its functions, parturition.

Module III
Muscular system
General account of the system, types of muscles, muscle contraction, Sliding filament theory, Biochemical events in muscular contraction, skeletal muscles of organs (brief)-pharynx, larynx, diaphragm, abdominal wall.

Module IV
Suggested Readings:

Chatterjee, C.C. (2005), Human Physiology, Vol I & II Medical Allied Agency, 82/1, Mahatma Gandhi Road, Kolkata – 700009.


SEMMESTER IV
GENERAL MICROBIOLOGY

CORE
Credit: 4

Objective
To enable the students to:

- To acquire an elementary knowledge about microorganisms
- To understand basics of microbial culture

Module I
Introduction to Microbiology: Definitions of microbiology and microbes,
Beneficial effects of microorganisms.
Microbial growth curve, Effect of intrinsic and extrinsic factors on growth curve:
PH, Moisture, Temperature, Oxygen availability, Nutrients and others.

Module II
Microorganisms: General morphology, Characteristics, Reproduction and Economic
importance of:
- Bacteria,
- Fungus
- Virus
- Algae
- Protozoa

Module III
Culture Media: Common ingredients, Culture techniques: Streak, Stroke, Pour
plate, Lawn, Cough plate methods, Observation of Microorganism: Direct and
Indirect methods

Module IV
Medical microbiology: Causative pathogens and clinical features of - Nosocomial
infection (HAI) - Bacteremia, Surgical site infection, UTI, Wounds and burns.
Opportunistic pathogens. Other common infections- Malaria, Filariasis,
Meningitis, Endocarditis, Dengue, Chickungunya, H1N1, Leptospirosis,
Cysticercosis, Hide angle cysts, Osteomyelitis, Skin infections.
Suggested Readings

Banwart, G.J, Basic Food Microbiology, AVI, New York
Frazier W.C and Westhoff D.C (1992), Food Microbiology, Tata McGraw Hill
Ray, B, Fundamentals of Microbiology, CRC Press, Boca Raton FL.
SEMESTER IV
FOOD COMMODITIES II

CORE
Credit: 4

CN4CRT11
Hours/week: 4

Objectives

To enable the students to:

1) To understand the basic commodities, both raw and processed used in catering and various aspects of their production and distribution.

11) To discuss the qualities and standard of available commodities and their suitability for different purposes.

Module I
Milk and Milk Products: Composition, Nutritive value, Processing- clarification, homogenization, pasteurization and freezing, Types of milk, Fermented and non-fermented milk products, Milk cookery.

Module II
Beverages: Tea, Coffee, Chocolate, fruit beverages, Milk beverages, Carbonated beverages, Malted beverages, Non alcoholic beverages and alcoholic beverages. Spices and condiments, Raising agents.

Module III
Meat: Classification, structure, Composition and Nutritive value, Post mortem changes, Ageing, Tenderizing, Curing, Selection and storage, Meat cookery.
Poultry: Classification, Processing, Composition and nutritive value, Storage.
Fish: Classification, Composition and Nutritive value, Selection, Fish cookery, Storage
Egg: Structure, Composition and Nutritive value, Egg quality and evaluation, Egg cookery, Egg white foams, Iron sulphide formation.

Module IV
Sugar and related products: Nutritive value, Properties, Sugar related products, stages of sugar cookery, Crystallization, Crystalline and non-crystalline candies, Role of sugar in cookery.
Suggested Readings

Objectives

To enable the students to:

- To emphasis skill development in the planning and preparation of therapeutic diet
- To provide greater exposure to modification in normal diet

Module I

Standardisation of portion sizes for different food preparations, use of weights and measures (raw weight v/s cooked weight), use of food composition table, menu planning and calculation

Planning and preparation of diet in cardiovascular diseases
- Hypertension with obesity
- CVD with Cirrhosis

Module II

Planning and preparation of diet in renal diseases
- Glomerulonephritis with CVD
- Nephrosis
- Renal failure

Module III

Planning and preparation of diet in gastrointestinal diseases
- Lactose intolerance with PEM and anaemia
- Constipation
- Peptic ulcer with Diarrhoea

Module IV

Planning and preparation of diet in diseases of liver and pancreas
- Cirrhosis with Hypertension
- Hepatitis
- Pancreatitis
Suggested Readings
Objective

To enable students to organize, prepare and serve food for three different meals.

Module I

Cereal Preparations
Rice Preparations: Chicken Biriyani, Vegetable Pulao, Tomato Rice.

Module II

Vegetable Preparations
Gobi Manchurian, Vegetable Khorma, Shahi Mattar.

Module III

Meat and Fish Preparations
Meat Preparations: Chicken Peggy Digo, Chicken curry, Green Chicken,
Fish Preparations: Tomato Fish, Chilly Fish, Fish Moilee

Module IV

Snacks, Sweets, Puddings And Desserts
Snacks: Onion Pakoda, Rainbow Sandwich, Vegetable Burger
Sweets: Carrot Burfi, Bread Gulab Jamun, Coconut Sweet
Puddings and Desserts: Chocolate Pudding, Bread Pudding, Fruit Triffle.

Suggested readings

Khandwala V. (1987), Relish Food The Vegetarian Way, Vakils, Fefferr and Simons Ltd., Bombay
Mathew K.M (2000), Modern Kerala Dishes
SEMESTER IV

BIOCHEMICAL ASPECTS OF NUTRITION

COMPLEMENTARY  CN4CMT07
Credit: 2  Hours/week: 3

Objectives
To enable the students to:

- To acquire knowledge about the micro nutrients and its functions in the body.
- To understand the metabolism of micro nutrients in human body

Module I

Metabolism of Macrominerals: Functions, Biochemical importance, metabolism, deficiency, and toxicity of the following minerals: Calcium, phosphorus, magnesium.

Module II

Metabolism of Microminerals: Functions, Biochemical importance, Metabolism, deficiency and toxicity of the following minerals: Iron, Zinc, copper, selenium, chromium, iodine, manganese, Molybdenum and fluorine.

Module III

Metabolism of Fat Soluble Vitamins: Functions, biochemical importance, metabolism, deficiency and toxicity of vitamin A, D, E, K.

Metabolism of Water Soluble Vitamins: Functions, Biochemical importance, metabolism, Deficiency, Toxicity of Thiamin, Riboflavin, Niacin, vitamin B6, Vitamin B12, Biotin, Pantothenic acid, Folic acid and Vitamin C.

Module IV

Nutrient-Nutrient interrelationships: Role of Vitamins and Minerals in macronutrient metabolism, micronutrient interrelationships.
Suggested readings

Satyanarayana.U (2005), Biochemistry, Uppala Author-Publisher Interlinks, Vijayavada, A.


COMPLEMENTARY CN4CMP03
Credit: 1 Hours/week : 2

Objectives:
To enable the students to get practical experience in lab and clinical nutrition.
To make the students aware of the constituents of blood.

Module I
Analysis of Blood for
- Glucose
- Total Protein, albumin and globulin
- Total Cholesterol and lipid profile

Module II
- Estimation of Acid phosphatase
- Estimation of Alkaline phosphatase

Module III
- Estimation of Iron
- Estimation of Haemoglobin

Module IV
- Estimation of SGPT
- Estimation of SGOT

Suggested readings
- Satyanarayana.U(2005), Biochemistry, Uppala Author-Publisher Interlinks, Vijayavada,A.
OBJECTIVES
To enable the students to
Understand the general structure and functions of various systems and organs of the body.
Understand the abnormal changes in the tissue and organs on several disease states.

MODULE I
Sense Organs
Structure, functions, physiology and diseases and disorders of Skin (integumentary system), Eye, Ear, Nose and Tongue.

MODULE II
Skeletal system
General structure and functions of bone, bone mineralization, factors affecting bone formation, A general account of axial skeleton and appendicular skeleton. Types of joints, Arthrology.

MODULE III
Regulatory Mechanism
Regulation of blood pressure, pulse, heart rate and temperature, adaptations during exercise.

MODULE IV
Physiology in special conditions
High altitude and space physiology, aviation physiology, deep sea physiology, effect of exposure to cold and heat.
Suggested Readings:

Chatterjee, C.C. (2005), Human Physiology, Vol I & II Medical Allied Agency, 82/1, Mahatma Gandhi Road, Kolkata – 700009.


SEMESTER IV
HUMAN PHYSIOLOGY PRACTICAL- II

COMPLEMENTARY

Credit : 1

Hours/ week : 2

Objectives

To enable the students to identify and analyses body cells and fluids.
To gain technical skill in physical examination of body.

Module I
Smear preparation of human blood for RBC and WBC types

Module II
Haematology
Testing of blood group
Bleeding time : Duke’s method
Blood clotting time : Wright’s method

Module III
Clinical examination of urine
Physical examination: Volume, colour, odour, appearance, $p^H$, specific gravity
Test for abnormal constituents of urine
Sugar
Blood
Albumin
Bile salts
Bile pigments
Ketone bodies

Module IV
Analysis of saliva
Amylase
Mucin
Calcium
Inorganic Phosphate
Suggested Readings

Chatterjee C.C (2003), Human Physiology, Kalyani Mukherjee Publishers, Kolkata.
SEMESTER V

FOOD MICROBIOLOGY, SANITATION AND HYGIENE

**CORE**

**Credit:** 3

**Hours/ week:** 5

**Objectives**

To enable the students to:

- Understand the role of microorganisms in food spoilage
- Know the need for implementing sanitary procedures and attitudes.

**Module I**

Contamination and spoilage of food: Sources of contamination and spoilage, Classification of foods based on perishability, General principles underlying food spoilage, factors affecting kinds and number of microorganisms in food, factors affecting the growth of microorganisms in food, chemical changes caused by microorganisms.

**Module II**

Contamination, spoilage and preservation of different foods:

i) Cereals and Cereal products  
ii) Fruits and Vegetables  
iii) Meat, Fish, Egg and Poultry  
iv) Milk and milk products  
v) Fats and oils

**Module III**

Quality control in food industry: Microbiology in food plant sanitation, Microbiological criteria for foods, packaging and labeling of foods.  
Control of microbial growth in foods: Microbial control strategies and methods of control, Measuring effectiveness of antimicrobial agents, phenol coefficient, TDP, TDT, DRT (D-value, z-value, F-value).

**Module IV**

Introduction to Sanitation and Hygiene: Definition of sanitation and hygiene, Significance of sanitation in food industry. Personal Hygiene of food handler.  
Cleaning Methods: Sterilization and Disinfection- products and methods, use of detergents, heat, chemicals, steps in cleaning utensils and equipments. Waste Product Handling – garbage and sewage disposal, Pest control.
Suggested readings
SEMESTER V
PERSONNEL MANAGEMENT

CORE
Credit: 3

CN5CRT13
Hours/week: 3

Objectives

To enable the students to

Understand the management of human resources in food service establishment.
Understand the management of material resources in food service establishment.

Module I
Organization and management: Organization- Definition, Functions, Types and Organization process, Management- Functions and tools of management, Technique of effective management, Energy and time management.

Module II
Food Material Management – Meaning, definition, importance, food selection, budgeting, purchasing, purchasing procedures, receiving, and receiving procedures, store-room management and store records.

Module III

Module IV
Laws affecting food service operations- Hospital, Flight/Railway kitchen, Hotels, Restaurants, Canteen and Industry. Labour policies and legislation, Union and contract negations.
Suggested Readings

SEMESTER V
RESEARCH METHODOLOGY AND STATISTICS

CORE
Credit: 4

CN5CRT14
Hours/week : 5

Objectives
To enable the students to learn
The fundamentals of research and statistics
Practical application of statistics in research

Module I
An introduction to research methodology: Meaning and importance of research, Objectives, Characteristics of research, Types of research, Criteria of good research, selection and formulation of research problem, Research design-Need and features.

Module II
Methods and tools of data collection: Sources of data-Primary, secondary and tertiary, Types of data-categorical, nominal and ordinal. Methods - Survey, observation, interview, case study. Tools - Questionnaire, Interview schedule, rating scales, other methods, Collection of secondary data.

Module III
Scientific Writing: Structure and components of scientific report, types of report, steps in report writing, components, precautions for report writing, preparation of scientific paper, bibliography, referencing and foot notes, plagiarism, citation and acknowledgement, ISBN and ISSN.

Module IV
Sampling and tabulation of data, Diagrammatic representation of data line and bar diagram, frequency polygon and pie diagram.
Statistical Methods and Analysis – Mean, Median, Mode, Standard deviation and Variance, Correlation, Regression analysis.
Suggested Readings

Module I

- Multidisciplinary nature of environmental studies

Definition, scope and importance, Need for public awareness. (2 hrs)

- Natural Resources:
  Renewable and non-renewable resources: Natural resources and associated problems.
  a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people.
  b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
  c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
  d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
  e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, Case studies.
  f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification
    Role of individual in conservation of natural resources. Equitable use of resources for sustainable life styles. (10 hrs)

- Ecosystems: Concept of an ecosystem, Structure and function of an ecosystem
  Producers, consumers and decomposers Energy flow in the ecosystem
  Ecological succession: Food chains, food webs and ecological pyramids.
  Introduction, types, characteristic features, structure and function of the given ecosystem:- Forest ecosystem (6 hrs)

Module II

- Biodiversity and its conservation
  Introduction, Biogeographical classification of India
  Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. India as a mega-diversity nation, Hot-spots of biodiversity
  Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts
  Endangered and endemic species of India (8 hrs)
• Environmental Pollution: Definition, Causes, effects and control measures of:
  a. Air pollution
  b. Water pollution
  c. Soil pollution
  d. Marine pollution
  e. Noise pollution
  f. Thermal pollution
  g. Nuclear hazards

Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution, Pollution case studies. Disaster management: floods, earthquake, cyclone and landslides. (8 hrs)

• Social Issues and the Environment, Urban problems related to energy

Water conservation, rain water harvesting, watershed management, Resettlement and rehabilitation of people: its problems and concerns, Case studies
Environmental ethics: Issues and possible solutions, Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, Case studies
Consumerism and waste products Environment Protection Act, Air (Prevention and Control of Pollution) Act Water (Prevention and control of Pollution) Act Wildlife Protection Act, Forest Conservation Act
Issues involved in enforcement of environmental legislation, Public awareness (10hrs)

Module III
  Space Nutrition: Physiological changes during space flight, types of space foods, space shuttle food system, and essential quality criteria required for space foods.

Module IV
  Nutrition In High Altitude: Physiological Changes, Nutritional Requirement, Food supplements, special foods.
  Sea voyages: Food on board, possible socio cultural and psychological causes for malnutrition, psychosocial and physical stress, diet pattern.

Module – V
  Human rights (10 hours)

  • Human Rights– An Introduction to Human Rights, Meaning, concept and development, Three Generations of Human Rights (Civil and Political Rights; Economic, Social and Cultural Rights).

• Human Rights in India – Fundamental rights and Indian Constitution, Rights for children and women, Scheduled Castes, Scheduled Tribes, Other Backward Castes and Minorities


REFERENCES
2.Clark.R.S., Marine Pollution, Claderson Press Oxford (Ref)
5.Down to Earth, Centre for Science and Environment (Ref)
12. Rajagopalan. R, Environmental Studies from crisis and cure, Oxford University
Objectives
To enable the students to-

To understand the role of fortification in national nutritional development.

To acquire knowledge about advantages, techniques and limitations of food fortification.

Module I
Food fortification – Needs, Objectives, Principles and rationale, Selection and basis of fortificants, Fortification as means of improving nutrition, Advantages of fortification, Criteria for selecting vehicles for food fortification, Limitations, Design of fortification programme, General techniques of food fortification.

Module II
Economic aspects of food fortification, Restoration and enrichment, Technological and cost limits of fortification, Enrichment and fortification programmes in India, Organic Vs inorganic salts, Newer trends and researches in food fortification.

Module III
Fortification with vitamin A, Iron, Iodine, Safety in nutrient fortification, Multiple nutrient fortification, Nutrient interaction and bioavailability of nutrients from fortified foods, Quality assurance and control in food fortification, Steps in implementation of food fortification quality assurance programme.

Module IV
Technology of fortifying cereals, beverages, snack products: Characteristics of nutrients used in cereal fortification, Types and levels of micronutrients to be added, Fortification of breakfast cereals.

Technology of fortifying beverages: Importance of beverage fortification, Health benefits of beverage fortification.

Snack products: Rationale for micronutrient fortification of snack products, Merits and demerits of snack fortification, and bioavailability.
Suggested Readings


SEMESTER V
FOOD SCIENCE PRACTICAL

CORE
Credit: 2

CN5CRP05
Hours/week: 2

Objectives
To enable the students to:
  Understand the effect of various cooking methods on different food groups.
  Understand the various methods of sensory analysis

Module I
  Starch cookery
    Gluten formation
    Gelatinization temperature
    Thickening power of starch
  Sugar cookery
    Stages of sugar cookery

Module II
  Milk cookery
    Curd formation
    Scum formation
    Scorching of milk
  Meat cookery
    Various cooking methods and their effect on meat
    Meat tenderization
  Egg cookery
    Characteristics of egg
    Eggs cooked in shell
    Egg white foaming

Module III
  Fruits and Vegetables
    Darkening of fruits
    Prevention of darkening
    Effect of acid and alkali on vegetable pigments
    Blanching

Module IV
  Sensory evaluation of foods: Sensitivity tests, Duo-trio test, Triangle test,
  Paired comparison test.
Suggested Readings


SEMESTER VI
FOOD SAFETY

CORE

CN6CRT17

Credit: 3

Objectives

To enable the students to acquire knowledge on:
- Food safety, hygiene and food hazards
- Food regulations (national as well as international)
- Design and implementation of food safety management systems such as ISO series, HACCP and its prerequisites such as GMP, GHP etc.

Module I

Introduction to Food Safety: Definition, Types of hazards and their impact on health, biological, chemical, physical hazards, and their control measures, Factors affecting Food Safety, Hygienic Food Handling, Purchasing and Receiving Safe Food—Important points to be observed for receiving various foods.
Sanitary procedures while preparing, cooking and holding food, Safety of left over foods, Food Storage—Guidelines for storage of foods at various temperatures, Storage of Specific Foods.

Module II

Food Borne Illness and Food Hazards
Food borne illnesses caused by Bacteria, Virus and Parasites. Natural toxicants in foods, Chemicals, Antibiotics, Hormones and Metal contamination.

Module III

Food Safety Management: Basic concept, Prerequisites—GHPs, GMPs and SSOPs, HACCP, ISO series, TQM—concept and need for quality, components of TQM, Kaizen. Risk Analysis, Accreditation and Auditing (in brief)
Safety concerns in food packaging: Principles in the development of safe and protective packaging, Product labeling, Nutritional labeling and safety assessment of food packaging materials.

Module IV

Food laws and Standards: Indian Food Regulatory Regime, Global Scenario, Other laws and standards related to food, FPO, PFA, FSSAI, AGMARK, BIS, GRAS and permissible limits for chemical preservatives and legal aspects for γ-irradiations.
Suggested Readings


Marriott, Norman G. (1985). Principles of Food Sanitation, AVI, New York,


SEMESTER VI

FOOD ADULTERATION

CORE
Credit: 3

Objectives
To enable the students to:
   To study different food adulterants and its impacts
   To identify the hazards from adulterants

Module I
Adulteration – Food adulteration - definition, types, natural toxins- naturally occurring toxicants in plants, mycotoxins, metal contaminants, pesticide residues, presence of extraneous material, residue from processing and packaging material, common adulterants and its detection, food grains, wheat flour, Bengal gram flour, dhal, sweet meat, milk and milk products, edible oils, ghee or butter, sugar, jaggery, honey, tea, coffee, soft drinks, spices and condiments.

Module II
Food additives - BHA or BHT, MSG, hydrolysed vegetable protein or autolysed yeast extract, potassium bromate, propyl gallate, sulfites, sodium nitrate, sodium benzoate, hydrogenated or partially hydrogenated oils.

Module III
Food colourants and sweeteners – Detection and health hazards of brilliant blue, indigo, carmine, citrus red, fast green, erythrosine, allura red, tartarzine, sunset yellow, food sweetners: high fructose corn syrup (HFCS), aspartame, sucrolase, saccharin, neotame, sorbitol and non certified sweetners.

Module IV
Emulsifiers, stabilizers, thickening and gelling agents: Tara gum, soyabean, hemicelluloses, sucroglycerides, stearyl tartarate, talc, gluconic acid, candelilla wax, carbamide, argon.
**Suggested Readings**

SEMESTER VI
PREVENTIVE NUTRITION

CORE
Credit: 3

CN6CRT19
Hours/week: 4

Objectives
To enable the students:

15. To understand the importance of preventive nutrition in the current scenario
16. To understand the role of Food security in National Development

Module I
Functional foods- free radicals, antioxidants, phytochemicals, prebiotics, probiotics and symbiotic. Fibre – classification, role, physiological and metabolic effect, Role of fibre in prevention of diseases.

Module II
Food security- Food Security Bill, Role of PDS, Dietary diversification, Food Revolutions, agencies for control of food losses- FCI, SGC, SWC, CWC.

Module III
Perspectives in preventive nutrition- fortification, enrichment, restoration, health supplements and proprietary foods, Nutrigenomics. Biomolecules as antibiotics, vitamins, pigments.

Module IV
Immunization – Significance, immunization schedule for children, adults and for foreign travels, Importance of vaccination in adulthood, Role of individual, family and community in promoting health.
Suggested Readings


SEMESTER VI

FOOD SERVICE MANAGEMENT

CORE

Credit: 3

Objectives

To enable the students to:

To develop skills in menu planning for quantity preparation.

To understand the different styles of food service in volume feedings.

Module I

Introduction to different food service outlets: Definition of catering industry, functions, types of catering establishments, commercial catering (hotels and restaurants), welfare catering (hospital), industrial catering and transport catering. Different food and beverage service outlet.

Module II

Menu planning: Sequence of course, Technique of writing menus, Functions of menu, Types of menu – Ala carte, Table d hote and combination menu, novelle cuisine, Different types of cuisines, Types of service, Styles of service, Services available in restaurant.

Module III

Equipments in food service: Classification of equipments, factors for selection of equipments, Service equipments, Care and use of equipment. Kitchen layout-Types of kitchen, location and layout.

Module IV

Staff organization of different outlets – manager, hostess, supervisor, steward, waiter. Uses of bills and checks on control system outlets.
Suggested Readings

England.
Shiring, S.B., Jardine, R.W. and Mills, R.J (2000), Introduction to Catering,
Thomson Asia Ltd., Singapore.
Varghese, B. (1999), Professional Food and Beverage Service Management,
Macmillan India Ltd.
Sethi, M and Malhan, S (1991), Catering Management, Wiley Eastern Ltd,
SEMESTER V
FOOD PRESERVATION

CORE
Credit: 4

CN6CRT21
Hours/week: 5

Objectives

To enable students to:

To study the principles and methods of food preservation
To understand about the various preservatives and their use in food

Module I

Principles of food preservation: Classification of food in relation to shelf life, Principles and importance of food preservation

Processing and preservation by heat: Blanching, Pasteurization, Sterilization and UHT processing, Canning, Extrusion cooking, Dielectric heating, Microwave heating, Baking, Roasting and Frying, Retort processing of ready to eat products.

Module II


Module III

Processing and preservation by drying, concentration and evaporation: Various methods employed in production of dehydrated commercial products, Selection of methods based on characteristics of foods to be produced, Advantages and disadvantages of different methods, Sun-drying, tray or tunnel drying, Spray drying, Drum drying, Freeze drying, Fluidized bed drying.

Module IV

Processing and preservation by non-thermal methods: High pressure, Hurdle technology. Use and application of enzymes and microorganisms in processing and preservation of foods, Food fermentations, Pickling, Smoking.
Suggested Readings

SEMESTER VI

EPIDEMIOLOGY

Objectives

To enable the students to-

To understand the role of epidemiological approach in disease prevention.
To acquire knowledge about the water and waste management.

Module I

Concept of Epidemiology: Study of the epidemiologic approach-determinants of disease preventive & social means, vital statistics and their significance. Principles of disease control

Module II

Secondary Sources of Community Health data: Sources of relevant vital statistics of infant, child & maternal mortality rates.

Module III

Immunization: Importance and schedule of Immunization for children, adults and for foreign travels, role of individual, family and community in promoting health.

Module IV

Water and Waste Management: Importance of water to the community, etiology and effects of toxic agents, water borne infectious agents, sources of water, safe drinking water, potable water, treatment of water for drinking purpose, waste and waste disposal, sewage disposal and treatment, liquid waste disposal.

Suggested Readings

SEMESTER VI
INFORMATION TECHNOLOGY

CORE
Credit: 3

Objectives
To enable the students:

To understand the fundamentals of computer applications.
To understand the practical applications of computer in nutrition science.

Module I

Module II
Computer arithmetic: Binary number system- addition, subtraction, multiplication and division. Conversion- binary to decimal, octal, and hexadecimal, conversion from hexadecimal, octal, decimal to binary.

Module III
Spread sheet packages: Spreadsheet concepts, Basic operations in EXCEL, Working with Charts, Formatting worksheets, Functions - Mathematical, Logical, Statistical, Text and Date and Time functions, Goal Seek, Scenarios, Auditing, Important Data menu commands.

Module IV
Use of computers in the field of nutrition - patient registration, diet prescription, counseling, research applications. Softwares in nutrition research: DIETCAL, WHO ANTHRO PLUS, ESHA etc. Statistical packages in research- SPSS, ATLAS.ti, Plagiarism softwares. Search engines, browsers, e-mail etiquettes.
Suggested Readings

Computer Fundamentals – P. K. Sinha and Priti Sinha
MS DOS 6.2 Quick Reference – Rajiv Mathur
Microsoft Office for Windows – Steve Sagman
MS Office 2000 – Dinesh Maidasani, Firewall Media
Objectives

To enable the students to:

- Learn the principles of meal planning
- Plan and prepare meals for the family members at different income levels and different physiological status

Module I

Basic principles of meal and menu planning.
Daily food guide – Basic five food groups, food pyramid, My plate, use of food groups, food costing.

Module II

Plan and prepare a diet for
a) Sedentary pregnant woman
b) Lactating mother (0 – 6 months)
c) Infant (0 – 6 months)

Module III

Planning and prepare a diet for
a) a pre-school child (1-3 years)
b) a school going child (boy and girl of 7-9 years)
c) an adolescent (boy and girl 17 – 19 years)

Module IV

Plan and prepare a diet for
a) sedentary, moderate and heavy worker (male and female)
b) a senior citizen
c) a middle income family
Suggested Readings

- Recommended Dietary Intake for Indians, ICMR (2010)
Objectives
To enable the students to:
  • To initiate research work among students

INSTRUCTION
The students will be guided and supervised by a member of the teaching faculty of the concerned department. The project in which the research culminates should reflect the student’s own work.
SEMESTER VI
ON JOB TRAINING

CORE CN6OJP08
Credit: 1

Objectives

To enable the students to:

- Understand clinical and pathological conditions of various diseases, planning diet, prescription and dietary intervention for the same
- Observe and study the food service management practices

INSTRUCTION

1. Each student is instructed to take up three case studies in order to familiarize various diseases and dietary management.
2. Assignment – 1
3. Seminar – 1
4. Project report – Presentation and viva