

Syllabus under Outcome-Based Education

BSc. Nutrition and Dietetics

For the Students Admitted in the

Academic Year 2021-2022

Courses of study, Schemes of Examinations & Syllabus

(Choice Based Credit System)



DEPARTMENT OF NUTRITION & DIETETICS

BISHOP HEBER COLLEGE (AUTONOMOUS)

(Affiliated to Bharathidasan University
Nationally reaccredited with 'A' Grade by NAAC
Recognized by UGC as "College of Excellence"
"Star College" Status Awarded by the DBT
DST-FIST Sponsored College)
Tiruchirappalli – 620 017
Tamil Nadu, India

Entrepreneurship (EN)

Employability (EM)

Skill Development (SD)

Course Type: Theory	Course Title: Food Science
Semester : I	Code : U17ND101
Credits: 5	

UNIT-I -15 Hours

Introduction to Food science

a) **Definition** -Food Science, Food, Nutrients, Nutritional status, Mal – nutrition-under nutrition over nutrition, Hunger- Hollow Hunger, Appetite Satiety and Health.

b) **Food groups** - Basic five food groups, Nutritional classification of foods - energy yielding, body building and protective foods.

c) **Methods of cooking** - Moist, dry and combination heat methods of cooking, Merits and demerits. Microwave cooking- principle, Merits & demerits.

UNIT-II 10 Hours

Cereals &Pulses

a) **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.

b) **Pulses:** Germination process, factors affecting cooking quality of pulses, composition, nutritive value, and its advantages in cookery.

UNIT-III 10 hours

Vegetables and Fruits

a) **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.

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

UNIT-IV 15 Hours

Milk and meat products

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

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

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

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

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

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Fats, Sugar, Beverages and Spices

- a) **Fats and Oils-** composition of common fats and oils, smoking temperature, rancidity and role of fats and oils in cookery.
- b) **Sugar** – Nutritive value, sugar related products, stages of sugar cookery, Crystallization, Factors affecting crystallization.
- c) **Beverages:** classification, nutritive value - coffee, tea, cocoa, milk based beverages, fruit juices and aerated beverages.
- d) **Spices and condiments** – Types and use in Indian cookery, Medicinal value.

Topics for self-study:

- Antioxidants in vegetables – Definition of antioxidants – relationship between free radicals and antioxidants - their role in boosting immunity.
<https://www.nccih.nih.gov/health/antioxidants-in-depth>
- Refining cooking oils – Process – advantages and disadvantages of refining oils – conventional oils vs refined oils.
<https://www.salonioil.com/refined-cooking-oil-their-dangerous-effects-on-health/>
- Comparison between sugar, jiggery and unrefined sugars.
<https://thewholetruthfoods.com/blog/sugar-honey-jaggery-which-is-healthier/>
- Genetically modified vegetables – advantages and disadvantages.
<https://www.gktoday.in/gk/advantages-and-disadvantages-of-genetically-modified-crops/>

Course Type: Core Practical	Course Title : Food Science Lab
Semester :I	Code : U17ND1P1
Credits:3	

2. Syllabus:

1. INTRODUCTION TO LABORATORY

Laboratory rules

Familiarizing with laboratory equipment, procedure, and learn to weigh food ingredients.

2. CEREALS

Microscopic examination of various starches.

Preparation of modified starch and their application.

Estimation of Gluten formation.

Preparation of cereal products using rice, wheat, ragi based on steaming, absorption, pressure cooking and straining methods.

3. PULSES:

Determination of Factors affecting cooking quality of pulses- use of hard water, soft water, sodium bi carbonate, vinegar; soaking and pressure cooking.

Preparation of few pulse recipes.

4. VEGETABLES AND FRUITS:

Effect of heat and pH on vegetable pigments like: chlorophyll, carotenoids, anthocyanin, anthoxanthin.

Effect of cooking on flavouring compounds of vegetables.

Browning reaction and its prevention.

Preparation of vegetable recipes by using the above experiment.

5. MILK COOKERY

Preparation of cheese, Paneer, Phirneeand Butter milk

6. EGG

Preparation of boiled egg, Scrambled egg, Poached egg, Omelette.

7. SUGAR

Enumeration in Stages of sugar cookery

8. FATS AND OILS:

Estimation of Smoking temperature of different fats and oils.

Preparation of few deep fat food products.

9. BEVERAGES:

Preparation and taste evaluation

Coffee

Tea

Soup and Few nourishing beverages (fruit and milk based).

Entrepreneurship (EN)

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Skill Development (SD)

Course Type: Allied Theory	Course Title : Food Microbiology
Semester : I	Code : U17ND1Y1
Credits: 4	

1. Syllabus

UNIT- I

10 Hours

Introduction to Food Microbiology

History and Development of Food Microbiology, Light and Electron microscopy, Definition and Scope of food microbiology ,Inter-relationship of microbiology with other sciences

UNIT- II

15 Hours

Characteristics of Microorganisms in Food

Types of microorganisms associated with food, - Bacteria, Virus, Fungi, Protozoan and Algae their morphology and structure, Growth and multiplication- growth curve, definition of batch and continuous culture. Factors influencing the growth- intrinsic factors, nutrient content, pH, redox potential, anti -microbial barrier and water activity. Significance of spores in food microbiology

UNIT- III

Microbial Food Spoilage

10 Hours

Sources of Microorganisms in foods, Types of food spoilage microorganisms
Spoilage of specific food groups- Milk and dairy products, Meat, poultry and sea foods, Cereal and cereal products, Fruits and vegetables and canned products .

UNIT- IV

15 Hours

Food Fermentations

Fermentation –definition and types, Microorganisms used in food fermentations

Dairy Fermentations-starter cultures and their types, concept of probiotics, types of fermented foods, methods and preparation for vinegar, sauerkraut, soya sauce.

UNIT- V

15 Hours

Role of Microbes

Soil – Role of microorganism in nitrogen cycle.

Water – bacteriological examination of water, water borne disease and their control.

Sewage – Types of sewage, method of sewage disposal

Air – principles of air borne disease and their control

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Topic for Self Study:

- Probiotics and prebiotics – difference - role of probiotics and prebiotics in gut health – natural and artificial probiotics.<https://www.prebiotin.com/prebiotin-academy/what-are-prebiotics/prebiotics-vs-probiotics/>
- Flavour changes in cheese due to the fermentation through various moluds
<https://www.cheesesience.org/microbes.html>
- Canning – principle behind canning – puffing of can – maintenance of headspace in can – botulism and botulinum poisoning in canned foods.
<https://ir.library.oregonstate.edu/downloads/ft848t80r>

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Course Type: Allied Practical - I	Course Title :FOOD MICROBIOLOGY AND FOOD CHEMISTRY
Semester : I	Code : U17NDYP1
Credits: 2	

2. Syllabus:

FOOD MICROBIOLOGY:

20 Hours

1. Instrumentation in microbiology laboratory and their function.(microscope, autoclave& hot air oven)
2. Preparation of culture media.
3. Preparation of Pure culture techniques (Spread plate, Streak plate, pour plate methods)
4. Estimation of Staining technique - simple and differential.
5. Preparation of Microbiological evaluation of milk and milk products.
6. Isolation of spoilage organism from different food commodities.
7. Estimation of Microbiological analysis of water and air.

FOOD CHEMISTRY

25 Hours

Chemistry of Starch and Sugars:

Gelatinization of starch,

Microscopic examination of uncooked and gelatinized starch

Estimation of Retro gradation and syneresis

Preparation of Gluten formation

Identification of Stages of sugar cookery

Preparation of fondant, Fudge, and Toffee

Preparation of Scum formation in milk.

Chemistry of Proteins:

Effect of Soaking, germination and fermentation of pulses

Preparation of coagulation in egg white and egg yolk.

Preparation of Boiled egg, poached egg, omelet's, Custards, Cake and Mayonnaise.

Preparation of Coagulation and precipitation of milk proteins.

Preparation of cooking Meat, Fish and Poultry,

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Testing the tenderness of meat by food thermometers

Chemistry of fat and Oils:

Estimation of Smoking temperature in different Fats.

Analysis of Factor affecting absorption of fat.

Effect of acids, alkali and heat on water soluble and fat-soluble pigments, Enzymatic browning and methods of prevention.

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Skill Development (SD)

Course Type: Theory	Course Title :HUMAN PHYSIOLOGY
Semester :II	Code :U17ND202
Credits:5	

1. Syllabus:

UNIT – I

20 Hours

Blood, Heart and Circulation

a) **Blood** : Composition, functions, RBC – Structure, functions, erythropoiesis, Haemoglobin, WBC –Structure, functions, Classification.

Blood Platelets: Structure, functions, Reticulo endothelia system, Blood groups –Rh factor. Blood coagulation, spleen –Structure and functions, Lymph – Lymphatic system.

b) **Heart and Circulation:** Heart – Anatomy and physiology, Blood vessels –Structure of artery, vein, capillaries, Cardiac output, Arterial Blood pressure, clinical measurement of blood pressure, properties of cordite muscle, origin and conduction of heart beat, cardiac cycle, Regulation of the Heart’s action.

UNIT – II

18 Hours

Respiratory and Excretory System

a) **Respiratory System:** Structure of respiratory organs, Mechanics of respiration, subdivisions of lung air, Chemistry of respiration. Artificial respiration, control of respiration.

b) **Excretory System - Physiology of kidney** – nephron, formation of urine, voiding of urine. Skin – Structure and functions, Regulations of body temperature.

UNIT – III

15 Hours

Digestive System-

a) General anatomy of digestive system – Digestive in the mouth, stomach and intestines, Movements of small intestine, Role of pancreas, Liver – Structure and function.

UNIT – IV

20 Hours

Endocrine and Reproductive system:

a) **Endocrinology - Structure and functions of thyroid, pituitary, parathyroid, adrenals, islets of langerhans of pancreas, sex glands.**

b) **Reproductive System** - General anatomy – Female and male reproductive system. Testis – Spermatogenesis, male sex hormones, ovaries – genesis, Female sex hormones, menstrual cycle. Phases and endocrine control. Mammary glands – Structure, lactation

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and process of reproduction, fertilization, development of embryo, pregnancy and parturition..

UNIT – V

17 Hours

Nervous System and Special Senses

Nervous System:

Spinal cord – Structure and functions. Ascending and descending tracts, reflex action.

Brain – Structure and functions of cerebrum, optic thalamus, midbrain, Pons medulla oblongata, Hypo thalamus, cerebellum.

Autonomic nervous system, sympathetic and parasympathetic.

Special Senses.

Physiology of vision, Structure of eye, dark and light adaptation, accommodation of the eye, visual fields, common due to abnormalities – presbyopia, cataract, Astigmatism, Blindness.

Ear – Structure and Physiology of hearing.

Topic for Self Study:

- Immunity – innate and acquired immunity.<https://www.creative-diagnostics.com/innate-and-adaptive-immunity>.
- Heart lung machine.https://www.youtube.com/watch?v=RmwMzw_YTNU
- Renal failure –Kidney transplantation and artificial kidney dialysis and home remedies of detoxification diet,<https://www.healthline.com/health/dialysis#risks>
- Neurotransmitters – dopamine, serotonin, endorphins, oxytocin.<https://www.healthline.com/health/happy-hormone#food>

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Course Type: CORE PRACTICAL	Course Title : HUMAN PHYSIOLOGY LAB
Semester :II	Code : U17ND2P2
Credits : 3	

Syllabus:

HUMAN PHYSIOLOGY

1. Histology of the epithelial, muscular, connective tissue.
2. Microscopic structure of bone and cartilage.
3. Microscopic structure of nerve.
4. Estimation of Haemoglobin, RBC and WBC count Demonstration.
5. Identification of different types of white blood cells – Demonstration.
6. Determination of blood groups.
7. Recording of normal heart beat of frog.
8. Effect of temperature on heart beat – demonstration.
9. Arterial blood pressure and pulse rate, effect of exercise.
10. Histology of artery, vein, trachea and lung.

Related Experiences

1. Visit to blood bank.
2. Observation of blood transfusion.

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Course Type: ALLIED COURSE	Course Title :FOOD CHEMISTRY
Semester :II	Code :U17ND2Y2
Credits : 4	

1. Syllabus:

UNIT – I

10 Hours

Chemical properties of food

Moisture in food, Hydrogen Bonding, Bound water, Water activity foods, Determination of moisture content in food.

True solution dispersion, Sols, Gels, Foams, Colloids and Emulsions

UNIT- II

10 Hours

Chemistry of sugar and starch.

Components of starch, Swelling of starch granules, Gel formation, Retro gradation, Syneresis.

Stages of sugar, Acid, Alkali, Fat and surface Active agents of starch.
Chemistry of Milk Sugar, Non Enzymatic Browning.

UNIT- III

20 Hours

Chemistry of Proteins

Components of wheat protein, Structure, Gluten Formation
Effect of soaking, Fermentation and Germination on Pulse proteins
properties of Egg Protein, Chemistry of Milk Protein, Changes in milk, Egg and Meat protein during **Heating action of heat, Acid, Alkalis on Vegetables Proteins and Animal Proteins.**

UNIT- IV

10 Hours

Chemistry of Fat and oils

physical and chemical properties of fat and oils.
Rancidity , Hydrogenation, Winterization, Decomposition of Triglycerides,
Shortening power of fats, Changes in fats and oils during Heating, Factors affecting fat absorption in foods.

UNIT- V

10 Hours

Plant Pigments

Pectins, Phenolic Components, Enzymatic browning in Fruits and vegetables.
Volatile compounds from cooked vegetables,
Estimation of different types of plant pigments – Water and fat soluble pigments Such as Chlorophylls,

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Topics for self-study:

- Relationship between moisture content of food and microbial spoilage.<https://www.fda.gov/inspections-compliance-enforcement-and-criminal-investigations/inspection-technical-guides/water-activity-aw-foods>
- Postharvest changes and storage of fruits and vegetables.<http://www.fao.org/3/y4358e/y4358e05.htm>
- Prevention of rancidity in oils – addition of antioxidants.[https://en.wikipedia.org/wiki/Rancidification#:~:text=Antioxidants%20are%20often%20used%20as,and%20tocopherols%20\(vitamin%20E\).](https://en.wikipedia.org/wiki/Rancidification#:~:text=Antioxidants%20are%20often%20used%20as,and%20tocopherols%20(vitamin%20E).)
- Role of non-enzymatic browning in food industry.https://en.wikipedia.org/wiki/Food_browning

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Course Type: SBEC -I	Course Title :Food Packaging
Semester :II	Code :U17ND2S1
Credits : 2	

1. Syllabus:

UNIT I **10 Hours**
PACKAGING

Concepts, definition, significance, classification. Development, unit/Retail. Fresh and processed, general characteristics and food preservation.

UNIT II **15 Hours**
PRIMARY PACKAGING MEDIA

Properties and applications.

Paper boards, metals, plastics, wood and plywood, glass, flexible, etc.

Labels, caps and closures, waxes, adhesives, inks and lacquers, cushioning materials.

UNIT III **15 Hours**
FOOD PRODUCTSPACKAGING SYSTEMS AND METHODS

General classification and packaging types.

Vacuum packaging, gas flush Packaging, CAP and MAP, aseptic and retort packing bagin-boxete.

UNIT IV **10 Hours**
STORAGE, HANDLING AND DISTRIBUTION OF PACKAGES (FOODS)

Palletization and containerization. **Marketing - barcoding and marketing.**

UNIT V **10 Hours**
PACKAGING LAWS AND REGULATIONS

FDA, FPO, packaging commodity.Rules, Weight and Measures Act.Meat Food Products Order (MFPO),Agricultural Grading & Marking (AGMARK) Rules,Edible Oil Packaging (Regulation) Order, 1998

The Standards of Weights & Measures Act (SWMA),Other Packaging Requirements under PFA

Topics for self-study:

- History of food packaging.https://en.wikipedia.org/wiki/Food_packaging
- Marketing strategies involved in food packages.<https://www.pkgbranding.com/blog/why-food-packaging-design-matters-to-your-overall-marketing-strategy>
- Edible food wraps.<https://www.ecolotec.com/do-eat/home-use.html>

Entrepreneurship (EN)

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Skill Development (SD)

Course Type: CORE THEORY	Course Title : PRINCIPLES OF NUTRITION
Semester :III	Code :U17ND303
Credits : 5	

Syllabus:

UNIT I

20 Hours

- a) Recommended dietary allowances – Definition, General principles of deriving RDA, Factors affecting RDA, Methods used for deriving RDA.
- b) Carbohydrates – Definition, Nutritional classification, Functions, Digestion and absorption, Requirements and Sources.
- c) Disorders- Diabetes mellitus – causes, symptoms, types of diabetes, principles of diet, preventing measures of diabetes mellitus, hormones involved in diabetes mellitus.
- d) Dietary Fibre – Definition, Classification, Sources and Role of Fibre in human Nutrition.

UNIT II

20 Hours

- a) Energy – Definitions, units of Energy, Determination of energy value of foods ,Bomp Calorimeter, Types of calorimeter- Direct and Indirect calorimeter and Thermal effect of food.
- b) BMR – Definitions, Determinations, Factors affecting the BMR, Specific dynamic action, Energy requirement and sources.

UNIT III

20 Hours

- a) Proteins – Definition, Nutritional classification of protein , Functions of Proteins ,Digestion and absorption Sources and Requirements. Deficiency Disorder- PEM, Amino acids- Essential and non-essential Evaluation of Protein quality – PER, BV, NPU and chemical score.
- b) Lipids – Definition, Nutritional classification, Functions, Digestion and absorption, Sources and requirements, Deficiency disorder – diseases related to heart

UNIT IV

15 Hours

- a) Vitamins – Classification, functions and Deficiency,
Fat Soluble Vitamins – Vitamin A, D, E and K – Functions, Requirements, Sources and Effect of deficiency.

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- b) Water soluble vitamins – Thiamine, Riboflavin, Niacin, Ascorbic acid, Folic acid, Vitamin B6 and B12 – Functions, Requirements, Sources and Effects of deficiency

UNIT V

15 Hours

- a) **Minerals – Classification and General Functions.** (B) Macro minerals – Calcium, Phosphorus, Magnesium, Sodium and Potassium – Functions, Requirements, Sources, Effects of Deficiency, Effect of imbalance of Sodium and Potassium.
- b) Micro Minerals – Iron, Iodine, Copper, Fluorine and Zinc – Functions, Requirements, Sources and Effect of Deficiency..

Topics for self-study:

- Fiber present in fenugreek and flaxseed – effect of flaxseed and fenugreek in reducing blood sugar and cholesterol level. <https://www.healthline.com/health/type-2-diabetes/fenugreek-blood-sugar#potential-risks>. <https://www.healthline.com/nutrition/flaxseed-for-diabetes>
- Vitamin C and vitamin D as immunity boosters. <https://medicaldialogues.in/diet-nutrition/news/vitamin-c-vitamin-d-supplements-may-boost-immune-system-to-fight-covid-19-65125>
- Effect of potassium rich foods in prevention of hypertension. <https://www.cdc.gov/salt/potassium.htm>

Entrepreneurship (EN)

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Skill Development (SD)

Course Type: CORE PRACTICAL	Course Title : PRINCIPLES OF NUTRITION LAB
Semester :III	Code : U17ND3P3
Credits : 3	

Qualitative Analysis:

1. Qualitative test for Carbohydrate – Glucose, Fructose, Lactose, Maltose and Galactose.
2. Qualitative test for Protein.
3. Qualitative estimation of iron, Ascorbic acid Vitamin A.
4. Demonstration of estimation of nitrogen.
5. Demonstration of fiber estimation.
6. Demonstration of total fat estimation.

Entrepreneurship (EN)

Employability (EM)

Skill Development (SD)

Course Type: ALLIED THOERY	Course Title FOOD STANDARD AND QUALITY CONTROL
Semester :III	Code : U17ND3Y3
Credits : 4	

Syllabus:

Unit I:

12 Hours

Food quality ,quality features of food, quality checking of raw materials and processed food ,simple technique of quality checking of raw food materials – cereals ,pulses, vegetables, fruits , milk and meat products, oils and spices and condiments, processed foods- tinned foods ,baked food, advantages of quality control and stages of quality control.

Unit-II

12 Hours

Quality control measures:

(a) **Food specifications**:- Food specifications for various food products- starchy food , milk and milk products, fruit products , beverages , spices and condiments , oils and fats; objectives and advantages .

(b) **Food Additives & their specifications**:- Classifications of food additives , usages and optimal level recommended for usage as specifications - Food colors , leavening agents , preservatives.

UNIT III

12 Hours

Quality Evaluation of food

(a) Subjective evaluation: Sensory characters of food, organs involved in assessment – physiological process, types of sensory test- requirements to contact sensory evaluation, Role and purpose and defects in sensory evaluation- panel member, essential qualities of a panel member, procedure of sensory evaluation, popular centres for sensory evaluation in India and their role.

(b), objective evaluation:

Objectives, requirements, different test,and instruments used for objective valuation ,advantages and limitations,popularcentre in India.

Unit-IV

Food contaminates and adultrants:

12 Hours

(a).Food toxins – Myco toxins – aflotoxins , aspergills and pencillium species, Mushroom poisoning sea food toxins.

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(b) Other toxins- Naturally occurring in foods ,Lathrogens , haemoagglutinins, goitrogens

(c) toxic minerals and other inorganic components in food and water: sellinium , Fluorine, nitrates and nitrites ,oxalate and phytates.

(d). **Food adulterations and food standards** : adulterations- Definition, common food adulterants : Test for detecting food adulterants ,contamination with toxic minerals, pesticides and insecticides : Effects of food adulterants and contamination, measures to control food adulterants .Prevention of food adulterants act

Unit –V

12 hours

Food standards and food laws:

(a) international food standard and Codex Alimentarius

(b) AGMARK & BIS

(c) FSSAI

(d) HACCP, **Topic for Self Study:**

- Adverse effects of excessive food colourants.<https://www.newdelhitimes.com/adverse-effects-of-artificial-food-dyes123/>
- Case studies from food industry regarding mishandling of food additives.<https://www.intechopen.com/books/nutrition-in-health-and-disease-our-challenges-now-and-forthcoming-time/food-additives-in-food-products-a-case-study>
- Role of sensory evaluation in coffee and tea industry.<https://www.alpha-mos.com/coffee-tea-0>
- Safety standards to be followed in food processing units.<https://www.ag.ndsu.edu/foodlaw/processingsector/rules-and-standards-for-food-processing>

Entrepreneurship (EN)

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Skill Development (SD)

Course Type: ALLIED PRACTICAL -II	Course Title : FOOD STANDARD AND QUALITY CONTROL AND NUTRITIONAL BIOCHEMISTRY
Semester :III	Code : U17NDYP2
Credits : 4	

Syllabus:

Qualitative Analysis of urine and blood.

1. Quantitative analysis of Urine sugar, protein, Bile pigments, Bile Salts
2. Estimation of Glucose in Urine(Benedict's Method)
3. Estimation of Urea in Urine (DAM Method)
4. Estimation of Blood Glucose (Folin-WU Method)
5. Estimation of Blood Urea (DAM Method)
6. Estimation of serum cholesterol (Zak's Method)

II FOOD STANDARD AND QUALITY CONTROL PRACTICAL

Display the standard food products available in the market.

III Food Adulterants

Physical and chemical method of identifying common food adulterants.

IV SE Common foods:

Sensory Evaluation of common foods by using five point Hedonic scale.

Course Type: NMEC-I	Course Title : BASICS IN NUTRITION
Semester :III	Code : U17ND3E1
Credits :2	

Syllabus:

Unit-I

Food:

Food definition ,classification of food, basic five food groups classification of nutrients, RDA- reference man and women, factors influencing RDA

Unit-II

Carbohydrates: functions, sources, classifications and requirements, disorder of CHO- under nutrition and obesity and Diabetes mellitus, Role of dietary fibre in health and disease.

Unit-III

Proteins:

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Sources, functions of proteins, nutritional classifications of amino acids and its requirements, deficiency of protein metabolism.

Unit-IV

Lipids:

Lipids - sources, functions of protein classifications and types of fatty acids and requirements, disorder of lipid metabolism- disease related to heart- hypertension and atherosclerosis.

UNIT -V

Macro minerals & Vitamins

Macro minerals: sources, functions. Classifications, Requirements of macro minerals and effect of deficiency and excess.

Micro minerals: sources, functions. Classifications, Requirements of iron, Iodine Zinc and flourine effect of deficiency and excess.

Vitamins

Fat soluble Vitamins: Vitamin A, Vitamin D, E & K. Functions, Sources, Requirements and Deficiency diseases.

Water soluble vitamins: Thiamine, Riboflavin, Niacin, Pantothenic acid, Biotin, Folic acid, Vitamin B12, VitaminB6 and Vitamin C, Functions, Sources , Requirements and Deficiency diseases.

Topics for self-study:

- Life style modification in prevention of diseases.https://www.health.harvard.edu/newsletter_article/Lifestyle_prevention_Does_it_work_And_why

Entrepreneurship (EN)

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Course Type: CORE THEORY	Course Title : NUTRITION THROUGH LIFECYCLE
Semester : IV	Code : U17ND404
Credits : 5	

Syllabus :

UNIT – I

20 Hours

a. Basics principles of meal planning, RDA , Food allowance for different age groups, factors influencing nutritional requirements for all age groups.

b. Nutrition during Pregnancy- stages of pregnancy, physiological changes, Weight gain in pregnancy, Complications, factors influencing the outcome of pregnancy, nutritional requirements and diet planning for pregnant women.

UNIT – II

15 Hours

Nutrition for lactating women- physiology and psychology of lactation, hormonal control, colostrums- composition, composition of breast milk, Factors affecting the volume and composition of breast milk, nutritional requirements of a nursing mother, diet planning, factors responsible for the lactating failure.

UNIT – III

20 Hours

a. Nutrition in infancy- birth weight of infants, rate of growth, milestones in development (only stage) immunization schedule, nutritional requirements, process of breast feeding, comparison of human milk with cow’s milk, artificial feeding, weaning and supplementary foods, feeding problems.

b. Nutrition in pre- school age- growth and development, nutritional requirements, factors affecting nutritional status, food requirement, low cost supplementary foods, nutrition related problems in childhood, diet planning for the pre- school child.

UNIT- IV

20 Hours

a. Nutrition in school age children – growth in school children, nutritional and food requirement, packed lunch- factors to be considered, sample menu for the school children.

b. Nutrition in adolescence – growth and development, body composition, puberty, secondary sexual characteristics, psychological changes, nutritional requirements, nutritional problems, malnutrition due to early marriage, food habits and diet plan.

UNIT- V

15 Hours

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a. Nutrition in adulthood – reference men and reference women, nutritional requirements of an adult man and women, body composition, nutrition and health issues, **planning diet to suit different income levels.**

b. Nutrition in elderly – definitions of geriatrics, changes in body composition, physiological changes, psychological and socio economic factors in relation to food intake, **nutritional**

Course Type: CORE PRACTICAL	Course Title : NUTRITION THROUGH LIFECYCLE LAB
Semester : IV	Code : U17ND4P4
Credits : 3	

requirement, modification of diet in old age.

Topics for self-study:

- Effects of alcohol and smoking on pregnancy.<https://share.upmc.com/2016/03/how-smoking-alcohol-drugs-harm-your-baby/>
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- Myths and realities regarding lactation.<https://www.chla.org/blog/rn-remedies/ten-myths-and-facts-about-breastfeeding>
- Feeding pre-term infants.https://www.who.int/elena/titles/feeding_vlbw_infants/en/
- Traditional food practices that are followed during puberty in girls and its significance.<https://www.prb.org/nutritionofwomenandadolescentgirlswhyitmatters/>

Syllabus:

Menu planning

1. **Planning , Preparing and serving a meal for**

- a. Expectant women
- b. Lactating women
- c. Infancy
- d. Pre-School children
- e. School going children
- f. Adolescent
- g. Adult
- h. Old age person

Entrepreneurship (EN)

Employability (EM)

Skill Development (SD)

Course Type: ALLIED COURSE	Course Title : NUTRITIONAL BIOCHEMISTRY
Semester : IV	Code :U17ND4Y4
Credits : 4	

Syllabus:

UNIT-I

12Hours

Carbohydrate Metabolism

Definition, Classification of carbohydrates – Monosaccharide, Disaccharide and polysaccharide. Metabolism – glycolytic pathway, Electron transport chain, glycogenesis, Glycogenolysis and Gluconeogenesis. **Disorder of carbohydrate metabolism**-Diabetes mellitus – Definition, Types, Diagnosis and Complications

UNIT-II

12 Hours

Protein metabolism

- Definition, Classification of protein, Structure, Physical properties, Chemical properties, Amino acids- Essential and non- essential.
- Inborn errors of aminoacid metabolism**-Albuminuria, phenylketonuria, cystinuria and Maple syrup disease.

UNIT-III

12 Hours

Lipid metabolism

- Definition, Structure, Classification of lipids-Saturated, Unsaturated fatty acid, Bio Synthesis of fatty acid.
- Lipoproteins**: Types, composition, role and significance in diseases.

Entrepreneurship (EN)

Employability (EM)

Skill Development (SD)

- c) **Inborn errors of fat metabolism**-Wolman disease, Gaucher's disease and Niemannpick disease.

UNIT-IV

12 Hours

Genetic & Liver Function Metabolism

- a) Nucleic acids – Types, Composition, Functions, Replication and Transcription.
- b) **Liver function test**- Functions of Liver, Tests based on metabolic functions, capacity for detoxification, enzymes, Bile Synthesis.

UNIT-V

12 Hours

Basic Clinical Techniques:

- a) Collection and preservation of blood and urine - Normal and abnormal constituents of urine and blood.

Renal Function Tests:

- b) Insulin clearance test, urea clearance test, endogenous creatinine clearance, concentration test, addis test, mosenthal test, urea concentration test and dye test.

Topics for self-study:

- Oligosaccharides in health and disease.<https://www.verywellfit.com/oligosaccharides-and-prebiotics-health-benefits-2242223>
- Branched Chain Amino Acids in energy production.<https://nutritionandmetabolism.biomedcentral.com/articles/10.1186/s12986-018-0271-1>
- EPA and DHA in health.<https://www.webmd.com/diet/features/what-to-know-about-omega-3s-and-fish#1>
- Common genetic aberrations.https://www.medicinenet.com/genetic_disease/article.htm

Entrepreneurship (EN)

Employability (EM)

Skill Development (SD)

Course Type: ALLIED PRACRICAL -II	Course Title : FOOD STANDARD AND QUALITY CONTROL AND NUTRITIONAL BIOCHEMISTRY PRACTICAL
Semester : III & IV	Code : U17NDYP2
Credits : 2	

Syllabus:

I Qualitative Analysis of urine and blood.

1. Quantitative analysis of Urine sugar, protein, Bile pigments, Bile Salts
2. Estimation of Glucose in Urine(Benedict's Method)
3. Estimation of Urea in Urine (DAM Method)
4. Estimation of Blood Glucose (Folin-WU Method)
5. Estimation of Blood Urea (DAM Method)
6. Estimation of serum cholesterol (Zak's Method)

II FOOD STANDARD AND QUALITY CONTROL PRACTICAL

Display the standard food products available in the market.

III Food Adulterants

Physical and chemical method of identifying common food adulterants.

IV SE Common foods:

Sensory Evaluation of common foods by using five point Hedonic scale.

Entrepreneurship (EN)

Employability (EM)

Skill Development (SD)

Course Type: NMEC -II	Course Title : DIET IN HEALTH AND DISEASE
Semester : IV	Code : U17ND4E2
Credits : 2	

Syllabus:

Unit-I

6 Hours

Nutrition and nutrients:

Food - definition ,classification of food, basic five food groups classification of nutrients, RDA- reference man and women, factors influencing RDA.

Macronutrients and micronutrients.

UNITII

6 Hours

Diet in Fever

- a. Causes, Types, general Dietary consideration
- b. Typhoid, Influenza, Malaria and Tuberculosis
- c. **Diet in Obesity and underweight.**

d. Nutritional Anaemia – prevalence, causes, Types, iron deficiency anaemia and Prevention of anaemia.

UNIY – III

6 Hours

Diet in Cardio vascular disease

- a. Prevalence, clinical effects
- b. Risk factors, Role of fat in the development of atherosclerosis
- c. Hypertension
- d. **Dietary management**
- e. physical activity and Heart diseases

UNIT IV

6 Hours

Entrepreneurship (EN)

Employability (EM)

Skill Development (SD)

Diet in Diabetes Mellitus

- a. Prevalence, Types, etiology and symptoms
- b. Diagnosis, treatment and Complication
- c. Dietary management

Diet in diseases of the Kidney

- a. Functions of kidney
- b. Symptoms, Chronic and acute renal failure and urinary Calculi
- c. Principles of Dietary Management

UNIT V

6 Hours

Diet in Cancer

- a. Risk factors and Symptoms
- b. Nutritional problems of Cancer therapy
- c. Nutritional requirements
- d. Role of food in the prevention of cancer.

Topics for self-study:

- Role of fiber in health and disease.<https://www.mayoclinic.org/healthy-lifestyle/nutrition-and-healthy-eating/in-depth/fiber/art-20043983>
- Common immunity boosters which help in viral infections.https://www.onhealth.com/content/1/immune_system_boosting_foods
- Prevention of diabetes and heart disease through lifestyle modification.https://www.health.harvard.edu/newsletter_article/Lifestyle_prevention_Does_it_work_And_why
- Harmful preservatives found in junk food.<https://www.icicilombard.com/blog/health-insurance/hi/5-harmful-effects-of-junk-food>

Entrepreneurship (EN)

Employability (EM)

Skill Development (SD)

Course Type:	Theory- Core V	Course Title :	DIETETICS- I
Semester :	V	Course Code :	U17ND505
Credits :	5		

UNIT – I

(18 hours)

Basic Concepts about Dietetics

- a. Definition of dietetics, dietitian, goals of diet therapy.
- b. Types of dietitian, role and responsibilities of dietitians, qualifications, qualities and professional ethics, code of conduct.
- c. Therapeutic adaptations of normal diet, Routine hospital diets –Regular, soft, full fluid, clear fluid diet.
- d. Specially modified therapeutic diets, High calorie, low calorie, high and low protein, bland, high and low residue diets.

UNIT- II

(18 hours)

Special feeding methods

- a. Enteral nutrition – methods – nasogastric, gastrostomy and jejunostomy. Types of food, infusion techniques, TPN – Types of infusion, TPN formula for adults.
- b. Dietary modification, diet planning and preventive measures for – PEM, iron deficiency anaemia and Vitamin A deficiency.
- c. Causes, risk factors, pathogenesis, dietary modifications, diet planning and counseling measures for febrile conditions – fevers of long duration and short duration.

UNIT- III

(18hours)

Malnutrition

- a. Causes, risk factors, pathogenesis, dietary modifications, diet planning and counseling measures for overweight.
- b. Causes, risk factors, pathogenesis, dietary modifications, diet planning and counseling for underweight.
- c. Anorexia nervosa and Bulemia.

Entrepreneurship (EN)

Employability (EM)

Skill Development (SD)

UNIT IV

(18hours)

Diseases of the gastrointestinal tract

Diseases of upper-gastrointestinal tract: Causes, pathogenesis, dietary modification and dietplanning for:

- (i) GERD
- (ii) Gastritis
- (iii) Peptic ulcer

Diseases of lower-intestinal tract: Causes, pathogenesis, dietary modification and diet planning for:

- (i) Diarrhea, dysentery
- (ii) Constipation.
- (iii) Haemorrhoids.
- (iv) Surgery of colon – gastrostomy, jejunostomy.
- (v) Cancer of colon.

UNIT V

(18hours)

Nutraceuticals & Dietary counselling

- (i) **Nutraceuticals** – Definition, types, use of nutraceuticals in the prevention and treatment of – obesity, Diabetes, CVD and Cancer.
- (ii) Functional foods .

Topics for self-study:

- Type of feeding in pre-term neonates. https://www.who.int/elena/titles/feeding_vlbw_infants/en/
- Different type of feeding techniques in bariatric surgery. <https://www.mayoclinic.org/tests-procedures/gastric-bypass-surgery/in-depth/gastric-bypass-diet/art-20048472>
- Traditional functional foods in preventing viral infections. <https://encyclopedia.pub/item/revision/1c614cb88c258b6b3e8e24d193f76d33>
- Nutraceuticals in alopecia. Nutraceuticals in alopecia.

Entrepreneurship (EN)

Employability (EM)

Skill Development (SD)

Course Type:	Theory- Core VI	Course Title :	COMMUNITY NUTRITION
Semester :	V	Course Code :	U17ND506
Credits :	5		

UNIT-I

(15hours)

Malnutrition

Nutrition and healthin **National Development**: Malnutrition - Etiology , symptoms, Under nutrition and Over nutrition, Prevalence of malnutrition, balance between food and population growth.

UNIT-II

Macro and Micro Nutrient Deficiency

(18hours)

Nutritional problems confronting our country - PEM - classification - Kwashiorkar and Marasmus - etiology, symptoms, pathological changes, biochemical changes, Anaemia- etiology, symptoms, prophylaxis Prevalence programmes.

UNIT-III

(21hours)

Nutritional Assessment

Methods of assessment of Nutritional status - sampling, Direct assessment - Diet survey, anthropometry, clinical and biochemical estimation. Indirect assessment - Food balance sheet, Agricultural data, Ecological parameter and vital statistics, use of growth chart.

UNIT-IV

(18hours)

Nutritional Programme

Role of National and International organizations - ICDS, Noon Meal Programme, FAO, WHO, UNICEF, CARE, ICMR, ICAR, CSIR, NIN, CFTRI, National Nutrition Policy, NGO.

UNIT-V

(18hours)

Nutrition Education& Intervention programme:

Entrepreneurship (EN)

Employability (EM)

Skill Development (SD)

Nutrition Education - Meaning, Scope, Methods - Planning, conduct of evaluation of Nutrition education Programme.

Topics for self-study:

- Incidence of vitamin B-complex deficiency in malnourished children.
<http://www.theprofesional.com/index.php/tpmj/article/download/3937/3041/>
- Food security and national development. <http://www.fao.org/sustainable-development-goals/overview/fao-and-the-post-2015-development-agenda/food-security-and-the-right-to-food/en/>
- New nutritional policies implemented recently (after 2018).
https://niti.gov.in/writereaddata/files/document_publication/Nutrition_Strategy_Booklet.pdf
- Public distribution system. <https://economictimes.indiatimes.com/definition/Public-distribution-system>

Course Type:	PRACTICAL - CORE	Course Title :	DIETETICS- I LAB
Semester :	V	Course Code :	U17ND5P5
Credits :	3		

Planning, Nutritive value calculation and preparation of Various Diets

- a. Clearfluid diet, full fluid diet and soft diet.
- b. Low and medium cost diet for protein calorie malnutrition,
- c. Fevers
- d. Diet for Vitamin A deficiency and iron deficiency anaemia
- e. diet for Obese and underweight conditions.
- f. Diet for Peptic ulcer, diarrhoea and constipation.
- g. Diet for Surgery and burns.

Entrepreneurship (EN)

Employability (EM)

Skill Development (SD)

Course Type:	Theory- Elective II	Course Title :	FOOD PRESERVATION
Semester :	V	Course Code :	U17ND5:1
Credits :	4		

UNIT I

(13hours)

PRESERVATION

- (i) History, importance.
- (ii) Definition, needs, principles of food preservation.
- (iii) Methods of low and high temperature.
- (iv) Dehydration – Types, objectives and principles of dehydration, steps involved in dehydration process, merits and demerits- effects on nutritive value in dehydrated foods.

UNIT II

(15hours)

FOOD ADDITIVES

- (i) Food additives – Definition; Preservatives – class 1 and class 2 preservatives, colours, flavouring agents, sweeteners, emulsifiers and stabilizers, leavening agents, antioxidants, flour improvers.
- (ii) Government regulations.

UNIT III

(17hours)

PRESERVATION TYPES

- (i) Bacteriostatic – Dehydration-types of dehydration (Sun drying, spray drying) Pickling, Salting, Smoking, Freezing – slow and quick, merits and demerits.
- (ii) Bactericidal – Canning-steps involved in the process of canning, Irradiation, microwave cooking.

UNIT IV

(15hours)

Food Spoilage

- (i) Definition, role of microorganisms in food spoilage, types of food spoilage, causes of spoilage, factors affecting spoilage, kinds of spoilage – perishable and non-perishable.
- (ii) Anaerobic and aerobic microorganisms involved in food preservation – mold, fungi, bacteria.
- (iii) Remedial measures to be taken on spoilage.

Entrepreneurship (EN)

Employability (EM)

Skill Development (SD)

(iv) Storage conditions – storage conditions leading to food spoilage.

UNIT V

(15hours)

PRESERVED FOODS

- (i) Products using sugar - squash, jam, jelly
- (ii) Products using salt - tomato ketchup, pickles, chutneys.
- (iii) Preservation using vinegar
- (ii) Preparation of dehydrated products – papads, vathal, vadams and dehydrated vegetables.

Topics for self-study:

- Walk-in refrigerators in Five-star hotels.<https://www.irl.co.in/products/walk-in-cooler.html>
- Conventional sun drying versus mechanized dehydration.<http://ecoursesonline.iasri.res.in/mod/page/view.php?id=111449>
- Natural food additives as antioxidants.<https://madridge.org/journal-of-food-technology/mjft-1-1000102.php>
- Fenugreek as a preservative.<https://www.freepatentsonline.com/6372220.html#>

Course Type:	Theory- Elective II	Course Title :	PRINCIPLES OF RESOURCE MANAGEMENT AND INTERIOR DESIGN
Semester :	V	Course Code :	U17ND5:3
Credits :	4		

UNIT I

(18hours)

- 1.1 **Resource Management:** Understanding, meaning, classification and characteristics of resources, factors affecting utilization of resources.
- 1.2 Maximizing the use of resources and resource conservation.
- 1.3 Availability and management of specific resources by an individual / family-money, time, energy, space.
- 1.4 **Functions of management:** Decision making, planning, supervising, controlling, organizing.

UNIT II

(18hours)

- 2.1 **Design and good taste:** Objectives of aesthetic planning, beauty, expressiveness, functionalism, concept of design, purpose of design, elements of design, types of design, structural design and decorative design.
- 2.2 **Colour:** **Sources of colour** – dimension of colour (hue, value, intensify/chroma). The pang colour system (primary, secondary, intermediate hue, tertiary and quaternary colour).
- 2.3 **Procedure for making a colour scheme for a room:** Factors affecting the use of colour scheme for room (the room, mood, style, fashion, personality, possession).
- 2.4 Application of art principle in the use of colours for a room (balance, proportion, harmony, rhythm, emphasis).

UNIT III

(18hours)

Entrepreneurship (EN)

Employability (EM)

Skill Development (SD)

- 3.1 **Lighting:** Source of light (natural, artificial light).
- 3.2 **Types of lighting:** General/ambient lighting, task lighting, accent lighting.
- 3.3 **Requirements of an ideal lighting installation** – Steadiness of the source of light, elimination of glare, avoidance of shadows, sufficient illumination to suit the nature of the visual task, nonproduction of excessive heat, minimum consumption of oxygen from the air.

UNIT IV

(18hours)

- 4.1 **Furniture:** Requirement and arrangement in the home, materials used in furnishing items.
- 4.2 **Furnishing:** Different types of furnishing, factors considered in the selection of furnishing.
- 4.3 **Floor coverings:** Factors for selecting floor coverings, salient features of carpet, types use and care of floor coverings.

UNIT V

(18hours)

- 5.1 Accessories: Selection, types, use and care of accessories.
- 5.2 Traditional and Modern: Art objects, pictures.
- 5.3 **Flower arrangement:** Principles, types and steps in preparing flower arrangement.

Topics for self-study:

- Comparison of resource management techniques at home and industry. <https://www.planview.com/resources/guide/resource-management-software/top-12-resource-management-best-practices/>
- Interior design for budget consumers. <https://www.housebeautiful.com/home-remodeling/interior-designers/g4293/interior-designer-tricks-to-update-a-room/>
- National and international flower arrangements. <https://www.myweddingplanning.in/wedding-flower-decor>
- Personal touch in decorating your house. <https://www.homify.in/ideabooks/729123/here-s-how-to-add-a-personal-touch-to-your-home-decor>

Entrepreneurship (EN)

Employability (EM)

Skill Development (SD)

Course Type:	Theory- SBEC II	Course Title :	NUTRITION IN SPECIAL CONDIITION
Semester :	V	Course Code :	U17ND5S2
Credits :	2		

UNIT I: (6 hours)

Nutritional care for the children with special needs

Overview of the disability, food and nutritional needs and their modification.

- i. Attention deficit hyperactivity disorder.
- ii. Autism.
- iii. Cerebral palsy.
- iv. Down's syndrome.

Unit-II (6 hours)

Epidemic diseases - (i) Dengue, chikenguniya and other epidemic conditions.

Hypothyroidism and hyperthyroidism.

Wilson's Disease.

Unit- III (6 hours)

Nutritional Emergency

Nutrition during emergency: Natural calamity - war, flood, fire famine

Nutrition in sea voyage, Mountaineering,

Unit- IV (6 hours)

Space Nutrition:

Food Selection. Food preparation for space ,Planning and serving the food, Classification of space food and Dehydrated foods use in space.

Unit – V (6 hours)

Armed forces nutrition:

The history of Military nutrition, Nutrient Support in Military person, the role of nutrient in injured person, Estimation of energy and protein metabolism in armed person.

Entrepreneurship (EN)

Employability (EM)

Skill Development (SD)

Topics for self-study:

- Role of nutrition in pandemic.
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7306972/#:~:text=Nutritional%20status%20of%20individuals%20has,to%20strengthen%20the%20immune%20system.>
- Recent natural calamity which needed nutritional support.
<https://www.todaysdietitian.com/newarchives/0118p34.shtml>
- Military nutrition in different terrains. <https://apps.dtic.mil/dtic/tr/fulltext/u2/a269969.pdf>
- Evolution of space nutrition. <https://www.history.com/news/cosmic-cuisine-the-evolution-of-space-food#>

Course Type:	Theory- SBEC III	Course Title :	BAKERY AND CONFECTIONERY
Semester :	V	Course Code :	U17ND5S3
Credits :	2		

UNIT I (6hours)

Introduction of bakery–definition, principles, types of baked and confectionary products.

Major and minor equipment – required to start a small bakery unit.

UNIT II (6hours)

Major and minor ingredient in baking

Major ingredients – flour, fat, sugar and leavening agent – types, role in bakery

Minor ingredients – milk, water, salt – types, role in bakery

UNIT III (6hours)

Bread

Principles involved in the yeast products preparation, methods – straight dough method, salt delayed method, no dough time method, sponge and dough method, ferment and dough method.

Methods of Processing

Faults and remedies in baked bread, types of bread improvers.

UNIT IV (6hours)

Cake

Principles involved in the preparation of cake, sponge cake – types (fatless sponge, Genoese sponge, plain sponge, gel sponge).

Methods – sugar batter method, flour batter method, blending method, boiling method, sugar water method, all-in process method (slow speed, medium speed, fast speed), foaming method.

Entrepreneurship (EN)

Employability (EM)

Skill Development (SD)

Faults and remedies in baked cakes.

Icing –Types and Preparation Methods

UNIT V

(6hours)

Biscuits and cookies

Principles involved in cookies preparation, methods for mixing cookies – single or one stage method, creaming or sugar batter method, blending or rub in method, foaming method, flour batter method.

Types – sheeted types, piped types, bar types, dropped types, rolled types

Difference between biscuits and cookies

Faults and remedies in baked biscuits and cookies

Topics for self-study:

- Preparation of pastries. <https://hmhub.me/pastry-recipes-and-methods-of-preparation/>
- Cookies using millets. <https://www.superhealthykids.com/recipes/millet-cookies/>
- Alternative for all-purpose flour. <https://www.thespruceeats.com/a-substitute-for-all-purpose-flour-3976522>
- International bakery products. <https://www.britannica.com/topic/baking>

Entrepreneurship (EN)

Employability (EM)

Skill Development (SD)

Course Type:	Theory- Core VII	Course Title :	DIETETICS- II
Semester :	VI	Course Code :	U17ND607
Credits :	5		

UNIT- I (15 hours)

Diabetes Mellitus

- a) Types –IDM, NIDM, GDM
- b) Pathogenesis, Symptoms, Causes, Diagnostic tests, Complications.
- c) Dietary modification and diet planning of the disease.

UNIT II (18 hours)

Diseases of the liver

- a) Diseases of the liver, gall bladder and exocrine pancreas – pathogenesis, causes, signs and symptoms, dietary modifications and diet planning for:
 - i. Liver- fatty liver, hepatitis, cirrhosis, hepatic coma
 - ii. Gall bladder – cholecystitis, cholelithiasis
 - iii. Pancreas – Pancreatitis.
- b) Nutritional care for patients with inborn errors of metabolism – prognosis, symptoms, dietary management – phenylketonuria, galactosemia.

UNIT- III (21 hours)

Kidney Disease:

Pathogenesis ,Symptoms, causes, Nutritional modification, diet planning and dialysis for kidney disease

- a) Nephritis
- b) Nephrosis
- c) Urinary Calculi
- d) Renal failure – acute and chronic

UNIT IV (16 hours)

Disease of the cardio vascular system

Pathogenesis, symptoms, causes, diagnostic tests, complications, dietary modification and diet planning of:

Entrepreneurship (EN)

Employability (EM)

Skill Development (SD)

- a) Hypertension
- b) Atherosclerosis – Myocardial infarction
- c) Ischemic heart disease
- d) Hyperlipidemia
- e) Acute and Chronic cardiac disease and congestive cardiac failure.
- f) CABG.

UNIT-V

(20 hours)

Skeletal and Allergy

- a) **Nutritional care in disease of the musculoskeletal system** – Arthritis, Osteoporosis, Gout, dental caries.
- b) **Allergies**– Food allergy and intolerance, Factors influencing ,Symptoms, test for allergy, Nutritional care and elimination diet.

Nutrition Care in Cancer and AIDS

- c) **Cancer – mechanism of cancer formation**, pathophysiology ,classification, , etiology, symptoms, dietary management and role of food in prevention of cancer.
- d) **AIDS** – epidemiological features, mode of transmission, clinical manifestation and dietary management.

Topics for self-study:

- Diseases caused due to autoimmunity and dietary modifications for the same.
<https://www.todaysdietitian.com/newarchives/110211p36.shtml>
- Correlation between diabetes, cardiac disease and renal disease.
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4045477/#>:
- Cardiac transplant and liver transplant – feeding patterns.
https://journals.lww.com/transplantationdirect/Fulltext/2019/01000/Simultaneous_Versus_Sequential_Heart_liver.9.aspx
- Nutrition in neurological disorders. https://illnutrition.com/mod_III/TOPI25/m251.pdf

Entrepreneurship (EN)

Employability (EM)

Skill Development (SD)

Course Type:	Theory- Core VIII	Course Title :	NUTRITION AND FITNESS
Semester :	VI	Course Code :	U17ND608
Credits :	5		

UNIT – I

(15 hours)

Body composition and fitness

Body Composition- classification (Fat mass and fat free Mass) and its components, factors influencing body mass composition. Techniques for measuring body composition

Fitness-definition, parameters of fitness- cardiovascular endurance, muscular strength, muscular endurance, flexibility and body composition

UNIT -II

(15 hours)

Assessment and benefit of exercise

Benefit of exercise- physiological, psychological and sociological. Physical activity guidelines.

Assessing personal fitness- preparticipation, screening and risk assessment.

Role of exercise in disease prevention – diabetes, cardiovascular disease, obesity, bone health and cancer.

UNIT – III

(15 hours)

Energy systems and electrolyte balance

Reviews of different energy systems for endurance and power activity- Fuels and nutrients to support physical activity .Shifts in carbohydrate and fat metabolism, mobilization of fat stores during exercise.

Water and electrolyte balance- Losses and their replenishment during exercise and sports event, effect of dehydration, sports drinks.

UNIT-IV

(15 hours)

Nutrition for sport persons

Entrepreneurship (EN)

Employability (EM)

Skill Development (SD)

Definition, physiological and significant changes during exercise, types of stress faced by sports persons, nutrition needs of sports persons-macro and micronutrient needs, role of water and electrolytes.

Role of nutrition and recommendations – pre-exercise, during and post –exercise

Nutrition supplement and ergogenic aids.

UNIT-V

(15 hours)

Yoga and nutrition fitness in special conditions

5.1 **Yoga and fitness**- effects on general vitality and on immune, endocrine, neurons, digestion and muscular systems, dietary pattern. Awareness about the alternative systems for health and fitness like ayurveda, yoga, vegetarianism and traditional diets.

5.2 **Nutrition and fitness in special conditions**- space mission and high altitude-changes in body composition, nutrient requirements, food system and suitable types of food.

Topics for self-study:

- BCAA as sports supplement. <https://www.otsuka.co.jp/en/nutraceutical/about/nutrition/sports-nutrition/essential-nutrients/bcaa.html#>:
- Carbohydrate loading. <https://www.mayoclinic.org/healthy-lifestyle/nutrition-and-healthy-eating/in-depth/carbohydrate-loading/art-20048518>
- Female athlete triad. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3435916/#>:
- Difference between sports drink and health drink. <https://www.aappublications.org/content/32/6/32.2#>

Entrepreneurship (EN)

Employability (EM)

Skill Development (SD)

Course Type:	Theory- Core IX	Course Title :	INSTITUTIONAL FOOD SERVICEMANAGEMENT
Semester :	VI	Course Code :	U17ND609
Credits :	5		

UNIT – I (15 hours)

Layout

Food Plan Layout: Flow of work, characteristics of a typical food service layout, layout of food plants-space allocation for the various areas and flow of traffic through receiving, storage, preparation, service and dish washing areas; arrangements of equipments in work centers; optimum working heights.

UNIT – II (15 hours)

Equipment and Furnishings

(i) **Classification of equipment**, factors involved in selection of equipments; purchase of equipment, operational know-how, care and maintenance of equipments; dining room furnishings.

(ii) **Materials Used:** Base materials used in the manufacture of equipments, materials used for finishes, materials used in the manufacture of dining room furnishings.

UNIT III (15 hours)

Food Service – Classification of food service according to

(i) **Types of food service systems** - Conventional systems, Commissary system, read prepared system and assembly –service system.

Entrepreneurship (EN)

Employability (EM)

Skill Development (SD)

(ii) Styles of Service : Service of food-self-service, tray service, Waiter –Waitress Service and portable service, formal and informal service

Meal Planning

(iii) Menu : Types of menu, Principles involved in menu Planning: Indian and Western, menu planner, why menu Planning; techniques in writing menu card.

UNIT – IV *Quantity Food Purchasing and Storage.* (15 hours)

Purchasing : Purchasing officer, duties, purchasing procedure, selection of supplier, methods of purchasing, purchase specifications.

(i) Receiving : Procedure and forms.

(ii) Storing and issuing : Objectives, types of store records, and stores issues.

Quantity Food Production and Service.

(iii) Quality standards and control.

(iv) Standardisation of recipes

(v) Portion control: Utilization of left over foods.

(vi) Ways and means of creating good atmosphere (Interior decoration)

(vii) Informal and formal service styles (Table Service)

UNIT – V (15 hours)

Cost control

(i) Food Cost Control : Principles of food cost control, elements of cost-food cost, labour cost and overhead expenses; why good cost control; factors responsible for losses in a food

(ii) Service industry; methods of controlling goods costs leading to profit; costing of dishes, meals and events; methods of pricing items.

Topics for self-study:

- International serving style. <https://djubo.com/blog/different-styles-service/>
- International cuisine. <http://www.your4sure.com/popular-international-cuisines/#>:
- Basics of accounting. <https://www.indeed.com/career-advice/career-development/basic-accounting#>
- Balance sheet basics. <https://www.accountingverse.com/accounting-basics/how-to-make-a-balance-sheet.html>

Entrepreneurship (EN)

Employability (EM)

Skill Development (SD)

Course Type:	Theory- Elective II	Course Title :	FOOD PRODUCT DEVELOPMENT AND MARKETING STRATEGY
Semester :	VI	Course Code :	U17ND6:4
Credits :	3		

UNIT-I

(15 hours)

Concepts of product development:

Basic principles and concept of food product development, cultural approach to development of dietary pattern of various groups-language, linguistic, regional, religious (ethnic), Factors involved in food habit alteration, availability, importance and role of different research and development departments in food production industry.

UNIT-II

(15 hours)

Market Process

Steps in product development-material resources based on market demand, standardization methods involved in product development. Portion size and portion control; Calculation of nutritive value and cost of production, shelf life and storage stability evaluation procedure of developed food products.

UNIT-III

(15 hours)

Formula Development

Formulation of new food products for infants, preschool children, adolescents, pregnant and nursing mothers, old age, sports persons, armed sources personnel and therapeutic uses. Selection and training of judges, Development of Score Card and analysis of data, Role of advertisement and Technologies in promotion of new products.

UNIT-IV

(15 hours)

Government proportion

Concept of market and marketing - approaches of study marketing and marketing functions, market structure, marketing efficiency and market integration, Role of Government in promoting agricultural marketing. Market promotion and positioning of food products.

UNIT-V

(15 hours)

Sanitation:

Conditions for sale, license and identification and quality processing, conditions for distribution, storage and sanitation, Studying the global market status, **Role of export promoting agencies, Economic feasibility of new products.**

Entrepreneurship (EN)

Employability (EM)

Skill Development (SD)

Topics for self-study:

- Low cost recipes. <https://vikaspedia.in/health/nutrition/nutritive-value-of-foods/low-cost-nutritious-supplements>
- Novel foods without preservatives. https://www.researchgate.net/publication/328283201_Novel_natural_food_preservatives_and_applications_in_seafood_preservation_A_review
- Spirulina in food processing industry. <https://www.longdom.org/proceedings/spirulina-arthrospira-platensis-as-food-a-commodity-to-better-feed-the-world-37470.html>
- Nutrigenomics in new product development. <https://www.newfoodmagazine.com/article/77093/inspiring-the-food-of-tomorrow/>

Entrepreneurship (EN)

Employability (EM)

Skill Development (SD)

Course Type:	Practical- Core	Course Title :	DIETETICS- II Practical & Dietary Internship
Semester :	VI	Course Code :	U17ND6P6
Credits :	3		

PLANNING, NUTRITIVE VALUE CALCULATION AND PREPARATION DIET FOR...

1. Diabetes Mellitus- IDDM, NIDDM and Gestational Diabetes
2. Hypertension, atherosclerosis and congestive heart disease
3. Nephritis, nephrotic syndrome acute and chronic renal failure and nephrolithiasis.
4. Liver disease – cirrhosis, jaundice, hepatitis.
5. Cancer
6. AIDS

Entrepreneurship (EN)

Employability (EM)

Skill Development (SD)