Syllabus

Bachelor of Science (B. Sc.)
in
Food, Nutrition and Dietetics (F.N.D.)

Department of Allied Health Sciences

School of Medical Sciences

Adamas University
Kolkata, West Bengal – 700126

YEAR – I

SEMESTER – I

SCHOOL OF MEDICAL SCIENCES

COURSE NAME: HUMAN NUTRITION - THEORY **50 HOURS**
COURSE CODE: FND31101
CONTACT: 3L
CREDITS: 4

COURSE OBJECTIVES: The course will enable the students to
1.) Understand the functions and sources of nutrients.
2.) Apply the knowledge in maintenance of good health for the individual and the community.
3.) Be familiar with factors affecting availability and requirements.

Unit I Basics of nutrition **12 hours**
Introduction to Human Nutrition-Orientation to human nutrition, an integrated approach, a conceptional framework for the study of nutrition, relationship between nutrition and health, nutrient: the basics, global malnutrition.
RDA- meaning, RDA of nutrients for different age groups.

Unit II Energy metabolism **10 hours**
Introduction - Introduction, measurement of food energy, energy intake and expenditure, measurement of energy expenditure, energy requirements, maintenance of body weight, excess energy intake, food sources of energy.

Unit III Proteins and amino acids **8 hours**
Introduction composition, classification, functions, food sources of protein, digestion, absorption, essential amino acid, protein deficiency.

Unit IV Carbohydrates **10 hours**
Introduction, composition, classification, functions, food sources, digestion, absorption, utilisation, regulation of blood sugar, Dietary fiber- Classification, sources, role in health and diseases.

Unit V Fats and other lipids **10 hours**
Introduction, composition, sources, classification, functions, digestion, absorption, essential fatty acids, Diet and heart ailments: effect of diet on plasma lipids, plasma cholesterol, plasma triglycerides.

REFERENCE BOOKS:
1.) Sumati R. Mudambi, M.V. Raja gopal – Fundamentals of Foods and Nutrition 4th edition, New Age International (P) Limited, Publishers, 2001.
2.) Mangala Kargo – Normal nutrition Fundamentals and management, RBSA Publishers, 2003.
3.) Michael J. Gibney, Hester H. Vorster and Frans J. Kok – Introduction to Human nutrition, Blackwell publishing 2003.
4.) Srilakshmi B (2015) Nutrition science - 4 th Ed., New age international Publ., New Delhi
Shills ME, Shike M, Ross AC, Caballero B, Cousins RJ (2005) Modern Nutrition in health and disease – 10th Ed., Lippincott Williams and Wilkins.

COURSE NAME: FOOD CHEMISTRY - THEORY **50 HOURS**
COURSE CODE: FND31103
CONTACT: 3L
CREDITS: 4

COURSE OBJECTIVES: The course will enable the students to
1.) Gain insight into the chemistry of foods.
2.) Understand the scientific principles involved in food preparation.
3.) Understand the various properties exhibited by foods.
4.) Study the physicochemical changes occurring in foods during cooking.

Unit I Hysico chemical properties of foods **8 hours**
Moisture in Foods, Hydrogen Bonding, Bound Water, Water Activity in Foods, Determination of Moisture Content in Foods. True Solutions, Dispersions, Sols, Gels, Foams, Colloids and Emulsions.

Unit II Chemistry of starch and sugars **10 hours**

Components of Starch, Swelling of Starch Granules, Gel Formation, Retrogradation, Syneresis.
Effect of Sugar, Acid, Alkali, Fat and Surface-Active Agents on Starch.
Stages of Sugar Cookery, Crystal Formation and factors affecting it. Types of Candies, Action of Acid, Alkali and Enzymes.
Chemistry of Milk Sugar, Non-Enzymatic Browning.

Unit III Chemistry of proteins **12 hours**

Components of Wheat Proteins, 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 Proteins during Heating Action of Heat, Acid, Alkalis on Vegetables Proteins and Animal Proteins.

Unit IV Chemistry of fats and oils **10 hours**

Physical and Chemical Properties of Fats 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 Chemistry of pectic substances, plant pigments, spices and condiments **10 hours**

Pectins, Phenolic Components, Enzymatic Browning in Fruits and Vegetables.
Volatile Compounds from Cooked Vegetables, Different Types of Plant Pigments – Water- and Fat-Soluble Pigments.

COURSE NAME: HUMAN PHYSIOLOGY - I - THEORY **50 HOURS**
COURSE CODE: FND31105
CONTACT: 3L
CREDITS: 4

COURSE OBJECTIVES: The course will enable the students to

1.) Understand the structure and functions of various organs of the body.
2.) Obtain a better understanding of the principles of nutrition through the study of physiology.
3.) Appreciate the importance of hormonal and nervous regulation of the body.

Unit I Blood and circulatory system **12 hours**

Blood – Composition and Functions; White Blood Cells – Types and function; Red Blood Cells – Structure and functions; Haemoglobin – Structure and functions; erythropoiesis, Blood coagulation, Reticuloendothelial System – Definition and functions; Blood group – ABO, Rh
Heart and Circulation – Structure of heart and blood vessels; Properties of cardiac muscle; cardiac cycle; origin and conduction of heart beat; measurement of arterial blood pressure.

Unit II Digestive system **10 hours**

General Anatomy; Digestion in the mouth, stomach and intestines. Movements of the intestine; Role of Liver and Pancreas – Structure and Functions.

Unit III Respiratory and excretory system **12 hours**

a) Respiratory System – Structure of Respiratory organs; Sub – divisions of lung air; Chemistry of Respiration.
b) Excretory system – Physiology of the Urinary System- Structure of kidney and nephron; Formation of urine, micturition. Skin – Structure and functions, Regulations of body temperature.

Unit IV Skin **6 hours**

Skin - function. Body temperature measurement, physiological variation, regulation of body temperature by physical, chemical and nervous mechanisms. Hypothermia and fever.

Unit V Reproductive system **10 hours**

Reproductive system and puberty. Male reproductive system - functions of testis, spermatogenesis, spermiogenesis - stages, factors influencing semen, endocrine functions of testis. Androgens - Testosterone - structure and functions. Female reproductive system - ovulation, menstrual cycle, physiological changes during pregnancy, pregnancy test. Lactation: Composition of milk factors controlling lactation. Contraception

REFERENCE BOOKS:

1.) Chatterjee C.C (2004), Human Physiology Volume I, Medical Allied Agency, Kolkata.
2.) Chatterjee C.C (2004), Human Physiology Volume II, Medical Allied Agency, Kolkata.
3.) Sembulingam, K. (2000) Essentials of Medical Physiology, Jaypee Brothers Medical Publishers (P) Ltd., New Delhi.
4.) Best and Taylor, (1992) The Physiological Basis for Medical Practice, Saunders Company.
5.) Chaudhri, K. (1993) Concise Medical Physiology, New Central Book Agency (Parentral) Ltd., Calcutta.

COURSE NAME: FUNCTIONAL FOODS AND NUTRACEUTICALS - THEORY 28 HOURS
COURSE CODE: FND31107
CONTACT: 2L
CREDITS: 2

COURSE OBJECTIVES: The course will enable the students to
1.) To develop comprehensive understanding of different nutraceuticals and functional foods.
2.) To understand phytochemical components and its management on health and diseases.
3.) To understand the potential of various functional foods in promoting human health.

Unit I Functional foods and nutraceuticals **7 hours**
Definitions, sources, Health benefits, bioactive components of functional foods. Development of functional foods, challenges and safety considerations, Future trends of functional foods. Dietary supplements and fortified foods- need, health benefits adverse effects.

Unit II Functional foods of animal and plant origin **5 hours**
Diary products, sea foods, eggs.
Fruits, vegetables, nuts, spices, cereals, beverages.
Probiotics,prebiotics and synbiotics as functional foods, Effects of probiotics on health.

Unit III Types of functional foods **4 hours**
Whole foods, enriched foods, enhanced foods, fortifiedfoods, modified foods. Market of functional foods, Challenges for Functional fooddelivery, Factors affecting consumer interest.

Unit IV Diet and disease relationship **5 hours**
Nutrition and health claims, Food component –approved health claims, labelling considerations for functional ingredients,Permissible and impermissible functional claims, Role of biotechnology in thedevelopment of functional foods.

Unit V Nutraceutical compounds **7 hours**
Phytochemicals, phytosterols and other bioactive compounds, peptides and proteins, carbohydrates, prebiotics, probiotics and synbiotics, lipids, vitamins and minerals; their sources and role in promoting human health.

REFERENCE BOOKS:

1.) N. Shakuntalamanay and M. Shadaksharaswam, Food Facts and Principles,3/e, New Age International, 2008.
2.) L. Branen, P. M. Davidson and S. Salminen, Food Additives. 2/e, Marcel Dekker, 2001.
3.) B. Gerorge, Encyclopedia of Food and Color Additives, Vol. III, CRC Press,1996.
4.) A. B. Gerorge. Fenaroli's Handbook of Flavor Ingredients. 5/e,.CRC Press,2004.
5.) D. L. Madhavi, S. S. Deshpande and D. K. Salunkhe, Food Antioxidants: Technological, Toxicological and Health Perspective. CRC press, 1995.
6.) I. D. Morton and A. J. Macleod, Food Flavours, Part C, Elsevier, 1990.

COURSE NAME: ENGLISH – I – THEORY **28 HOURS**
COURSE CODE: FND31109
CONTACT: 2L
CREDITS: 2

COURSE OBJECTIVES: The course will enable the students to
1.) To enhance syntactic understanding among students.
2.) To develop language proficiency among the students.

Unit I Tenses **5 hours**
Types of tenses, Transformation of verbs in different tense forms, Practice exercises; Common errors-detecting errors in a sentence, Correction of sentences, Re-arranging jumbled sentences, Practice exercises.

Unit II Preposition **8 hours**
Position of nouns in a sentence. Narration: Direct and indirect speech, Building Vocabulary: Synonyms and Antonyms, Pair of words having the same sound but different meaning. Paragraph writing: Writing short paragraphs within the given word limit. Comprehension: To be able to comprehend the given text or passage. Precise Writing.

Unit III Selected novels **5 hours**
Best Loved Indian Stories of the Century Volume -1 (Selected and Edited by Indira Srinivasan and Chetnabhat).

Unit IV Selected poems **4 hours**
Toru Dutt- 1. Our Casuarina Tree; 2. Baugmaree;
Nissim Ezekiel-1.Night of the Scorpion; 2. Poet, Lover, Birdwatcher
Rabindranath Tagore: 1. Where the Mind is Without Fear; 2. Baby's World

Unit V Idioms, phonetic sounds **6 hours**
One word substitution, Word formation, Idiomatic Expressions
Identification of phonetic sounds and symbols Stress and Intonation.
Listening Comprehension Conversation Practice.

REFERENCE BOOKS:
1) A textbook of Compulsory English by Dr Ranu Vanikar and Dr Katayun Palia. Vikas Publishing House Ltd.
2) Allen, W. Standard. 1962 Living English Structure, Orient Longmans, London.
3) Jones, Daniel. 1993. Everyman's English Pronouncing Dictionary, University Book Stall, New Delhi.
4) Jones, Daniel. 1970. An Outline of English Phonetics, Arnold, London.
5) George, H.V. 1970. Common Errors in English Learning, M/s Newbury House, London.
6) Sharma, S.D. 1984. A textbook of Spoken and Written English, Vikas, Delhi Practical Biochemistry: R. L. Nath. A treatise on Analysis of Food, Fats and Oils: A .R .Sen, N.K. Pramanik and S.K .Roy.

COURSE NAME: DESIGN THINKING
COURSE CODE: DGS11001
CONTACT: 2L
CREDITS: 2

SCOPE: This is an introductory course in design thinking. This subject deals with the introduction to design thinking, design thinking model, discover, define.

COURSE OBJECTIVE:
On completion of this course, the students will be able to:
1. Examine design thinking concepts and principles
2. Practice the methods, processes, and tools of design thinking
3. Apply the Design Thinking approach and model to real world scenarios
4. Analyze the role of primary and secondary research in the discovery stage of design thinking

Unit I What is design thinking **2 hours**

Designers seek to transform problems into opportunities. Through collaboration, teamwork, and creativity, they investigate user needs and desires on the way to developing human-centered products and/or services. This approach is at the very heart of design thinking.

Unit II The design thinking model **2 hours**

A tool that helps guide you along a design thinking path. The model does this by providing a series of activities that that will help you effectively design a product, service or solution to a user's need. The model presents the approach as a process, allowing us to look at each step – or phase – along the journey to the development of a final design.

Unit III PHASE 1: Discover **4 hours**

Begin the design thinking process with the Discover phase, where you will identify the specific problem your design is intended to solve, as well as important usability aspects from those who will use your design. Discovery can be performed through a variety of different research methods which you will learn in this module.

Unit IV PHASE 2: Define **4 hours**

In the Define phase, you come to understand the problem. We often refer to this as framing the problem. You can do this by using a variety of tools, including storytelling, storyboarding, customer journey maps, personas, scenarios, and more.

Unit V PHASE 3: Develop **4 hours**

Turn your attention to solving the problem. In this phase you brainstorm custom creative solutions to the problems previously identified and framed. To do this, you conceptualize in any way that helps, putting ideas on paper, on a computer, or anywhere whereby they can be considered and discussed.

Unit VI PHASE 4: Deliver **4 hours**

This phase is all about testing and building concepts. Here you take all of the ideas that have been discussed to this point and bring them a little closer to reality by building a concept; something that makes it easier for a user to experience a design. This concept is referred to as a prototype.

Unit VII PHASE 5: Iterate **4 hours**

You will test the prototype of your design solution, collecting and acting on feedback received. These actions may mean minor or major revisions to your design, and are repeated as often as necessary until a solution is reached. Tools such as focus groups and questionnaires are used to help you collect feedback that can help with your final design.

Unit VIII Beyond design thinking **2 hours**

The Design Thinking Model is a tool that helps guide you along a design thinking path. The model does this by providing a series of activities that that will help you effectively design a product, service or solution to a user's need. The model presents the approach as a process, allowing us to look at each step – or phase – along the journey to the development of a final design.

TEXT BOOKS

1. All the references are available to download in the online course.

REFERENCE BOOKS

1. Brown, Tim. "What We Can Learn from Barn Raisers." Design Thinking: Thoughts by Tim Brown. Design Thinking, 16 January 2015. Web. 9 July 2015.
2. Knapp, Jake. "The 8 Steps to Creating a Great Storyboard." Co.Design. Fast Company & Inc., 21 Dec. 2013. Web. 9 July 2015.
3. Van der Lelie, Corrie. "The Value of Storyboards in the Product Design Process." Journal of Personal and Ubiquitous Computing 10.203 (2006): 159–162. Web. 9 July 2015. [PDF].
4. Millenson, Alisson. "Design Research 101: Prototyping Your Service with a Storyboard." Peer Insight. Peer Insight, 31 May 2013. Web. 9 July 2015.

COURSE NAME: HUMAN NUTRITION - PRACTICAL **2 HOURS/WEEK**
COURSE CODE: FND31201
CONTACT: 2P
CREDITS: 1

1) Qualitative tests for proteins.
2) Qualitative test for amino acids.
3) Qualitative test for carbohydrates.
4) Qualitative estimation of lipids and fats.
5) Quantitative estimation of proteins.
6) Quantitative estimation of glucose.
7) Quantitative estimation of lipids.
8) Estimation of total lipid in egg yolk.

REFERENCE BOOKS:

1) Sumati R. Mudambi, M.V. Raja gopal – Fundamentals of Foods and Nutrition 4th edition, New Age International (P) Limited, Publishers, 2001.
2) Mangala Kargo – Normal nutrition Fundamentals and management, RBSA Publishers, 2003.
3) Michael J. Gibney, Hester H. Vorster and Frans J. Kok – Introduction to Human nutrition, Blackwell publishing 2003.
4) Srilakshmi B (2015) Nutrition science - 4 th Ed., New age international Publ., New Delhi
5) Shills ME, Shike M, Ross AC, Caballero B, Cousins RJ (2005) Modern Nutrition in health and disease – 10th Ed., Lippincott Williams and Wilkins.

COURSE NAME: FOOD CHEMISTRY PRACTICAL **2 HOURS/WEEK**
COURSE CODE: FND31203
CONTACT: 2P
CREDITS: 1

1.) Physical properties of foods- water activity, specific gravity and refractive index.
2.) Effect of temperature on taste.
3.) Comparison of sweetness of sugars.
4.) Odours and physical state of lipids and fatty acids.
5.) Oxidative rancidity.
6.) Qualitative tests for carbohydrates.
7.) Qualitative tests for proteins.
8.) Qualitative tests for amino acids.
9.) Effect of heat on proteins.
10.) Coagulation of proteins.

REFERENCE BOOKS:

1.) Shakuntala Manay, Shadaksharaswamy. M (2000) Foods, Facts and Principles, New Age International Pvt Ltd Publishers, 2nd Edition.
2.) Chandrasekhar, U. Food Science and applications in Indian Cookery (2002) Phoenix Publishing House, New Delhi.
3.) Swaminathan, M. Food Science, (2005) Chemistry and Experimental Foods, Bappco Publishers, Bangalore.
4.) Meyer, L.H, Food Chemistry, (2004) CBS Publishers and Distributors, 4th edition.
5.) Paul, P.C. and Palmer, H.H. Food Theory and Applications (2000) JohnWiley and Sons, New York, (Revised Edition).
6.) Chopra H.K, Panesar, P.S, Food Chemistry (2010) Narosa Publishing House, New Delhi.

SEMESTER – II

COURSE NAME: FOOD MICROBIOLOGY - THEORY **50 HOURS**
COURSE CODE: FND31102
CONTACT: 3L
CREDITS: 4

COURSE OBJECTIVES: The course will enable the students to
1.) Acquire an elementary knowledge and understand the relevance of microscopy and its applications in everyday life.
2.) Develop an understanding of the role of microorganisms in food industry and in the maintenance of health.

Unit I Introduction to Microbiology and Structure of Microorganisms **12 hours**
Definition and History: Microscopy, Light and electron Microscopy, Listing other TypesGeneral Morphology of Microorganisms Bacteria, Fungi, Algae, Yeast and VirusBacteriophage

Unit II Growth and Multiplication **10 hours**
Growth Care, Definition of Batch and Continuous culture, Factors Affecting Growth: Intrinsic Factors, Nutrient Content, Ph, Redox Potential, Antimicrobial Barrier and Water Activity. Extrinsic Factors: Relative Humidity, Temperature and Gaseous Atmosphere

Unit III Microbiology of Perishable Foods **8 hours**
Outline of Contamination- Spoilage and Preservation of Vegetables and Fruits, Milk and Milk Products and Canned Foods, Meat and Meat Products, Egg and Poultry

Unit IV Microbiology of Non-Perishable Foods **10 hours**
Outline of Contamination- Spoilage and Preservation of Cereal and Cereal Products and Sugar and Sugar Products

Unit V Beneficial Effects of Microorganisms **10 hours**
Fermented Foods – Curd, Cheese, Sauerkraut, Meat, Soy Based Foods, Alcoholic Beverages and Vinegar, Microbial Biomass

REFERENCEBOOKS:
1.) M.R. Adams and M.O. Moss, Food Microbiology, New Age International (P) Ltd., New Delhi, 2005.
2.) Vijaya Ramesh, K. Food Microbiology, MJP Publishers, Chennai, 2007.
3.) James G. Cappuccino and Natalie Sherman, Microbiology – A Laboratory Manual, Pearson Education Publishers, USA, 2008.
4.) James M. Jay Modern Food Microbiology, Fourth Edition, CBS Publishers and Distributors, New Delhi, 2005.
5.) Adams Tamine, Probiotic Dairy Products, Blackwell Publishing, USA, 2005.

COURSE NAME: FOOD SCIENCE - THEORY **50 HOURS**
COURSE CODE: FND31104
CONTACT: 3L
CREDITS: 4

COURSE OBJECTIVES: The course will enable the students to
1.) Obtain knowledge of different food groups, their composition and their role in diet.
2.) Study the different methods of cooking foods.
3.) Obtain knowledge about the nutrients present in the foods.

Unit I Food Science **8 hours**
Definitions- Food Science, Food, Nutrients, Nutritional Status, Mal-nutrition- Under – nutrition, over nutrition, Balanced diet, Hunger- Hollow Hunger, Hidden Hunger, Appetite, Satiety, Health, Meal, Menu.
Food Groups- Basic five, Nutritional classification of foods – Energy yielding, Body building and protective foods.
Cooking- Objectives, cooking methods- Moist and Dry heat methods of cooking, merits and demerits.

Unit II Cereals, Pulses and Nuts **12 hours**

Cereals and Cereal products- Structure and Nutritive value of rice and wheat, nutritional importance of millets– maize, jowar, ragi, bajra, milling of rice and wheat, parboiling of rice, Products of wheat and rice, Enrichment and fortification of cereals and flours, Batters and doughs; Malting of cereals.

Pulses and Nuts- Nutritive value, factors affecting cooking quality of pulses, germination – process, advantages

Unit III Vegetables and Fruits 8 hours

Vegetables- Botanical classification, Nutritive value, Pigments- fat soluble, water soluble, selection of vegetables, cooking of vegetables- changes during cooking, nutrient loss, effect of cooking on the pigments

Fruits- Classification, Nutritive value, changes during ripening of fruits, enzymatic browning and prevention, storage.

Unit IV Milk, Milk Products, Eggs, Meat, Poultry **14 hours**

Milk and Milk Products- Composition and Nutritive value, Different types of milk, pasteurization of milk, milk products- dry milk, cheese. Steps of milk processing: collection, chilling, standardization, pasteurization, homogenization, bactofugation, and principles of dehydration

Eggs- Structure, Composition and Nutritive value. Measures of egg quality, role of egg in cookery.

Meat- structure, composition, a list of different types of meat, cuts of meat, post mortem changes in meat, and tenderness of meat.

Poultry- composition and classification. e. Fish- structure, composition, nutritive value, selection of fish.

Unit V Fats, Sugars, Spices and Condiments **8 hours**

Fats and oils- composition processing and refining of fats, refined oils, plasticity, hydrogenation, winterization. Smoking point, factors that lower smoking point, absorption of fat during cooking.

Sugar- nutritive value, sugar related products, stages of sugar cookery, crystallization, factors affecting crystallization.

Spices and condiments- types and uses in Indian cookery, medicinal value.

COURSE NAME: HUMAN PHYSIOLOGY - II - THEORY **50 HOURS**
COURSE CODE: FND31106
CONTACT: 2L
CREDITS: 2

COURSE OBJECTIVES: The course will enable the students to

1.) Understand the structure and functions of various organs of the body.
2.) Obtain a better understanding of the principles of nutrition through the study of physiology.
3.) Appreciate the importance of hormonal and nervous regulation of the body.

Unit I Endocrine System **12 hours**

Definition, classification of endocrine glands and their hormones, properties of hormones. Thyroid gland hormones – regulation of secretion. Disorders – hypo and hypersecretion of hormone. Adrenal gland - physiological anatomy. Adrenal cortex, cortical hormones – functions and regulation. Adrenal medulla – hormones, regulation and secretion. Functions of adrenaline and nor-adrenalin. Pituitary hormones – anterior and posterior pituitary hormones, secretion, function. Pancreas – hormones of pancreas. Insulin – secretion, regulation, function and action. Diabetes mellitus – regulation of blood glucose level. Parathyroid gland – function, action, regulation of secretion of parathyroid hormone. Calcitonin – function, action, Ca metabolism and hormone regulating Ca metabolism.

Unit II Nervous System and Muscular System **15 hours**

Functions of nervous system, neuron structure, classification and properties, neuroglia. Nerve fibre, classification, conduction of impulses, factors affecting conduction. Synapse - structure, types, properties. Receptors - definition, classification, properties. Reflex action - reflex arc, properties of reflex action. Spinal cord nerve tracts - function. Functions of medulla, pons, hypothalamus. Cerebral cortex, lobes and functions, sensory cortex, motor cortex. Cerebellum - functions. Basal ganglia - functions, EEG, Parkinson's disease. Cerebro Spinal Fluid (CSF) - formation, circulation, properties, composition and functions, lumbar puncture, sleep, types of sleep.

Muscle nerve physiology: Classification of muscle, structure of skeletal muscle, sarcomere, contractile proteins. Neuromuscular junction, transmission across neuromuscular junction, excitation contraction coupling. Mechanism of muscle contraction muscle tone, fatigue. Rigor mortis, isometric and isotonic concentration. Autonomic nervous system: Sympathetic and parasympathetic distribution and functions.

Unit III Excretory System **10 hours**

Excretory organs - Kidney: function, structural and functional unit - nephrons, vasarecta, cortical and juxtamedullary nephrons - comparison, juxtaglomerular apparatus - structure and function. Renal circulation peculiarities. Mechanism of urine formation – ultrafiltration, criteria for filtration, GFR, plasma fraction, determination of GFR. Selective reabsorption - sites of reabsorption, substance reabsorbed, mechanisms of reabsorption. Tubular secretion, properties and composition of normal urine output. Abnormal constituents of urine. Counter-current mechanisms: micturition, innervations of bladder, cystourethrogram. Diuretics: water, diuretics, osmotic diuretics, artificial kidney, renal function tests.

Unit IV Blood and Circulatory System **7 hours**

Blood – Composition and Functions; White Blood Cells – Types and function; Red Blood Cells – Structure and functions; Haemoglobin – Structure and functions; erythropoiesis, Blood coagulation, Reticuloendothelial System – Definition and functions; Blood group – ABO, Rh

Heart and Circulation – Structure of heart and blood vessels; Properties of cardiac muscle; cardiac cycle; origin and conduction of heart beat; measurement of arterial blood pressure.

Unit V Sense Organs **6 hours**

Eye- Function of different parts of eye, light reflex, refractive errors, colour blindness, night blindness, accommodation. Ear –Function of ear, deafness, vestibular apparatus. Taste buds – functions, smell physiology, receptors. Smell and cutaneous sensations.

REFERENCE BOOKS:

1.) Guyton AC, Hall JE (1996) Textbook of Medical Physiology, 9th Ed., Prism Books Pvt Ltd., Bangalore.
2.) Chatterjee CC (1988) Human Physiology, Calcutta, WB Wilson (1989).
3.) Anatomy and Physiology in Health and Illness, Edinburgh Churchill Livingstone Sembulingam K, Sembulingam P (2012).
4.) Essentials of medical physiology, Jaypee Publ.

COURSE NAME: ENGLISH – II - THEORY **28 HOURS**
COURSE CODE: FND31108
CONTACT: 2L
CREDITS: 2

COURSE OBJECTIVES: The course will enable the students to
1.) To enhance writing ability among students.
2.) To develop language proficiency and communication skills among the students.

Unit I C.V. Writing, Job Application Letter, Complaint Letter **8 hours**

Methods to write a good and effective C.V., Rules to be followed as well as points that should be avoided while preparing a C.V., Practice exercises.Job application letter, complaint letter- Rules and methods for writing official letters, Sample letters to be provided.

Unit II Modes of Communication **4 hours**

Request, command, wish, permission.

Unit III Situational Conversation **4 hours**

Facing an interview, Telephone conversation, Practical exercises.

Unit IV Communication Skills **4 hours**

Presentation Skills, Interview Skills, E-mails, Memos.

Unit V Selected Novels and Poems **8 hours**

Novels- The Grandmother's Tale and Selected Stories By R. K. Narayan (1994) Viking press, Malgudi Days by R.K Narayan (1934) Indian Thought Publications.

Poems- A.K. Ramanujan- Breaded Fish, Self-Portrait; Kamala Das- My mother at sixty-six, My Grandmother's House.

REFERENCE BOOKS:

1.) A textbook of Compulsory English by Dr RanuVanikar and Dr KatayunPalia. Vikas Publishing House Ltd.
2.) Strunk, Jr.; William and White, E.B. (1967). The elements of style. New York: Macmillan.
3.) Sherman, T.A. and Simon, S. J. (1990). Modern technical writing. New Jersey: Prentice-Hall.
4.) Alvarez, J.A. (1980). The elements of technical writing. New York: Harcourt.
5.) Krishnamohan and Banerjee, M. (1990). Developing Communication Skills. MacMillan India Ltd, New Delhi.

COURSE NAME: VENTURE IDEATION
COURSE CODE: EIC11001
CONTACT: 2L
CREDITS: 2

In venture ideation, students are taught regarding entrepreneurship, idea generation, opportunity assessment, problem analysis and various other aspects of creation of businesses. They get in-depth understanding and knowledge of major aspects of entrepreneurship. The element includes Idea generation, resources identification, financial management, legal aspects, etc.

COURSE NAME: FOOD MICROBIOLOGY - PRACTICAL **2 HOURS/WEEK**
COURSE CODE: FND31202
CONTACT: 2P
CREDITS: 1

1. Instrumentation in Microbiology laboratory and their function (Microscope, Autoclave, Hot air oven).
2. Preparation of Culture media.
3. Pure culture techniques (spread plate, streak plate and pour plate methods).
4. Staining techniques-simple and differential.
5. Microbiological evaluation of milk and milk products.
6. Microbiological analysis of water and air.
7. Isolation of spoilage organisms from different food commodities.

REFERENCEBOOKS:

1) M.R. Adams and M.O. Moss, Food Microbiology, New Age International (P) Ltd., New Delhi, 2005.
2) Vijaya Ramesh, K. Food Microbiology, MJP Publishers, Chennai, 2007.
3) James G. Cappuccino and Natalie Sherman, Microbiology – A Laboratory Manual, Pearson Education Publishers, USA, 2008.
4) James M. Jay Modern Food Microbiology, Fourth Edition, CBS Publishers and Distributors, New Delhi, 2005.
5) Adams Tamine, Probiotic Dairy Products, Blackwell Publishing, USA, 2005.

COURSE NAME: FOOD SCIENCE - PRACTICAL **2 HOURS/WEEK**
COURSE CODE: FND31204
CONTACT: 2P
CREDITS: 1

1.) Cereals – Preparation of rice by steaming, absorption method, Straining and Pressure cooking. Batters and dough. Preparation of Idli, Dosa, Upma, Kichadi, Chapathi, Poori, Fried Rice, Briyani and variety rice.
2.) Pulses – Factors affecting the cooking quality of pulses. Preparation of Sambar, Sundal, Bholi, Mysore-pak, Vada, Channa Masala, Thuvaiyal, Green gram payasam, Besanomlette, Sprouted salad and koottu.
3.) Vegetables – Selecting, cleaning, coring, pitting and chopping of fruits and vegetables. Avial, porriyal, pugath, stew, kuruma, cutlet, fry, chips, podimas, pachadi, stuffed chapathi, koottu.
4.) Fruits – Fritters, Halwa, Salad, Stuffed items, Jelly, Payasam, Thokku, Sauce and Jams.
5.) Milk – Cottage Cheese, Paneer, Phirnee, Payasam, Ice cream, kova, Buttermilk curry, Basanthi and Jamun.
6.) Egg – Boiled, Scrambled, Poached, Curry, Masala, Omelette.
7.) Three Course, Five Course and Seven Course menu planning.
8.) Score card preparation and sensory evaluation.

REFERENCE BOOKS:
1.) Potter, N. and Hotchkiss, J.H. Food Science, 5th Ed., CBS Publications and Distributors, Daryaganji, New Delhi, 1998.
2.) Shakuntala Manay, Shadaksharaswamy. M (2000) Foods, Facts and Principles, New Age International Pvt Ltd Publishers, 2nd Edition.
3.) Usha Chandrasekhar, Food Science and Application in Indian Cookery, Phoenix Publishing House P. Ltd., New Delhi, 2002.
4.) Srilakshmi, B. Food Science, New Age International Publishers, New Delhi, 2010 5. Swaminathan, M, Hand Book of Food Science and Experimental Foods, BAPPCO, Bangalore, 1992.
5.) Brow, A., Understanding Food, Thomson Learning Publications, Wadsworth, 2000.
6.) Mehas, K.Y. and Rodgers, S.L. Food Science and You, McMillan McGraw Company, New York, 2000.
7.) Parker, R. Introduction to food Science, Delmer, Thomson Learning Co., Delma, 2000.

COURSE NAME: HUMAN PHYSIOLOGY - PRACTICAL **2 HOURS/WEEK**
COURSE CODE: FND31206
CONTACT: 2P
CREDITS: 1

1.) Histology of Tissues – Columnar, cubical, ciliated, squamous, stratified squamous.
2.) Microscopic structure of organs – lungs, artery, vein, stomach, ovary, testis, uterus, pancreas.
3.) Histology of muscles – cardiac, striated, non – striated.
4.) Estimation of Haemoglobin, bleeding time, Clotting time.
5.) Measurement of Blood pressure – before and after exercise.
6.) Determination of Respiratory rate and Pulse rate – before and after exercise.
7.) Determination of Blood group.
8.) Determination of Rh factor.
9.) Enumeration of Red blood cells – Demonstration.
10.) Enumeration of White blood cells – Demonstration.
11.) Differential Leucocyte count – Demonstration.
12.) Visit to a Clinical laboratory.

REFERENCE BOOKS:

1) Guyton AC, Hall JE (1996) Textbook of Medical Physiology, 9th Ed., Prism Books Pvt Ltd., Bangalore.
2) Chatterjee CC (1988) Human Physiology, Calcutta, WB Wilson (1989).
3) Anatomy and Physiology in Health and Illness, Edinburgh Churchill Livingstone Sembulingam K, Sembulingam P (2012).
4) Essentials of medical physiology, Jaypee Publ.

ADAMAS UNIVERSITY
SCHOOL OF MEDICAL SCIENCES

YEAR – II
SEMESTER – III

SCHOOL OF
MEDICAL SCIENCES

COURSE NAME: PRINCIPLES OF NUTRITION - THEORY **50 HOURS**
COURSE CODE: FND32101
CONTACT: 3L
CREDITS: 4

COURSE OBJECTIVES: The course will enable the students to
1.) Gain basic knowledge of the different nutrients.
2.) Get insight into the role of nutrients in maintaining health of the individual and community.
3.) Understand the interrelationship of the various nutrients.

Unit I Nutrition **8 hours**
Recommended dietary allowances – Definition, General principles of deriving RDA, Factors affecting RDA, uses of RDA.
Carbohydrates – Definition, Nutritional classification, Functions, Requirements and Sources, Regulation of Blood Sugar level.
Dietary Fibre – Definition, Classification, Role of Fibre in Preventing disease and sources.

Unit II Proteins and Lipids **10 hours**
Proteins – Definition, Composition, Nutritional classification of protein and amino acids, Functions of Proteins and amino acids, Sources and Requirements, Deficiency; Evaluation of Protein quality – PER, BV, NPU and chemical score.
Lipids – Definition, Composition, Nutritional classification, Functions, Sources and requirements; Essential fatty acids – Definition, Functions, Sources and effects of deficiency.

Unit III Energy and Basal Metabolic Rate **8 hours**
Energy – Definitions, Energy units, Determination of energy value of foods by direct and indirect calorimetry and physiological Energy Value of foods.
BMR – Definitions, Determinations, Factors affecting the BMR; Energy requirements for physical activity – Factorial method, Energy requirement and sources.

Unit IV Minerals **12 hours**
Minerals – Classification and General Functions.
Macrominerals – Calcium, Phosphorus, Magnesium, Sodium and Potassium – Functions, Requirements, Sources, Effects of Deficiency, Effect of imbalance of Sodium and Potassium.
Microminerals – Iron, Iodine, Copper, Flourine and Zinc – Functions, Requirements, Sources and Effect of Deficiency.

Unit V Vitamins **12 hours**
Vitamins – Deficiency, Classification and General Functions.
Fat Soluble Vitamins – Vitamin A, D, E and K – Functions, Requirements, Sources and Effect of deficiency.
Water soluble vitamins – Thiamine, Riboflavin, Niacin, Ascorbic acid, Folic acid, Vitamin B6 and B12 – Functions, Requirements, Sources and Effects of deficiency.

REFERENCE BOOKS:
1.) Swaminathan, M., Essentials of food and Nutrition, Vol I & II, Bappco Publishers, Madras 2000.
2.) Srilakshmi. B., Nutrition Science, New age International (p) ltd, publishers, 2004.
3.) Frances sizer and Ellie whitney, Nutrition Concepts and Controversies, Thomson wadsworth Publisher, New York, 2006.
4.) Mangale Kango, Normal Nutrition, Curing Diseases through Diet, CBS publication, First edition, 2005.
5.) Bonnie, Worthington – Roberts and Sue Rodwell Williams, Nutrition throughout the life cycle, 3rd edition, WCB/MC Graw Hill Publisher, New York, 1996.
6.) Paul. S., Text of Bio Nutrition Fundamental and Management, RBSA Publishers, 2003

COURSE NAME: DIETETICS - I - THEORY **50 HOURS**
COURSE CODE: FND32103
CONTACT: 3L
CREDITS: 4

COURSE OBJECTIVES: The course will enable the students to
1.) To understand the foundation sciences which underpin therapeutic dietetic practice, the principles of disease prevention and health promotion, the principles of therapeutic intervention practice.
2.) To understand the organization, management and provision of healthcare both in the hospital and in primary care.

Unit I Diet Therapy **12 hours**
Basic Concepts of Diet Therapy, Nutrition Care Process: Definition of MNT, Nutritional Assessment (ABCD), Nutritional Diagnosis, Nutrition Intervention, Monitoring & Evaluation of Nutritional Care.
Modifications of the Normal Diet- General or Regular, Adequate or House Diet, Soft Diet, Liquid Diets- Clear Liquid Diet, Full Liquid Diet.
Mode of Feeding- Enteral or Oral Route- Enteral (via) tube feeding Parenteral – Peripheral Vein Feeding, Total Parental Nutrition (TPN).

Unit II Nutrition During Febrile Disorders **5 hours**
Classification of fevers, Metabolism, General Dietary Considerations
Acute & chronic fevers -Typhoid &Tuberculosis

Unit III Nutrition for Weight Management **8 hours**
Assessment of obesity – BMI, Waist Hip-Ratios, Skin folds Thickness.
Etiology – Genetic Factors, Physiological Factors, Behavioral factors.
Metabolism in obesity – Basal Metabolism.
Treatment – Dietary Management, Fad diets and their consequences.
Underweight – Etiology, Health hazards, Treatments.

Unit IV Nutrition in Gastrointestinal Disorders **12 hours**
General Dietary Considerations for healthy gut Peptic Ulcer Disease – Etiology, Symptoms, Dietary Management Intestinal Diseases – irritable bowel syndrome (IBS), Constipation, Diarrhea Diseases of the Small Intestine – Celiac Disease – Gluten Sensitive Enteropathy, Tropical Sprue, Lactose Intolerance Inflammatory Bowel Disease - Crohn's Disease, Ulcerative Colitis

Unit V Nutrition in Diseases of the Liver **13 hours**
Hepatitis- Types, Etiology, Symptoms, Treatment.
Cirrhosis- Etiology, Clinical Symptoms, Treatment.
Hepatic Encephalopathy- Etiology, Clinical Symptoms, Treatment.
Diseases of the Gall Bladder- Cholecystitis and Cholelithiasis

REFERENCE BOOKS:
1.) Antia, F.P. (2005): Clinical Nutrition and Dietetics, Oxford University Press, Delhi.
2.) Mahan, L.K., Arlin, M.T. (2000): Krause's Food, Nutrition and Diet therapy, 11th edition, W.B.Saunders Company, London.
3.) Robinson,C.H;Lawler,M.R.Chenoweth,W.L;andGarwick,A.E(1986):Normal and Shubhangini A Joshi (2002): Nutrition and Dietetics2nd edition, Tata Mc Graw-Hill Publishing Company Limited, New Delhi.
4.) Srilakshmi,B.(2005):Dietetics,5th edition, New Age International(P) Limited Publishers, New Delhi..
5.) Therapeutic Nutrition,17th Ed., Mac Millan Publishing Co.
6.) Williams's (1989): Nutrition and diet Therapy.6th edition. Times Mirror/Mosby College Publishing, St.Louis.

COURSE NAME: NUTRITIONAL BIOCHEMISTRY - THEORY **50 HOURS**
COURSE CODE: FND32105
CONTACT: 3L
CREDITS: 4

COURSE OBJECTIVES: The course will enable the students to
1.) Develop an understanding of the principles of biochemistry.
2.) Apply the knowledge acquired to human nutrition.

Unit I Carbohydrates **12 hours**
Carbohydrates- Definition, classification. Structure (linear) of Monosaccharides- Glucose, fructose and galactose; Disaccharides- Maltose, lactose and sucrose; Polysaccharides- Starch and glycogen. Metabolism- Glycolytic pathway, electron transport chain and oxidative phosphorylation. Definition of glycogenesis, glycogenolysis and gluconeogenesis.

Unit II Proteins **10 hours**
Protein- Definition, classification, structure, physical properties, chemical properties and utilization. Aminoacids- Types, definition of deamination, transamination and decarboxylation. Enzymes and co-enzymes- Definition, types, classification and factors affecting velocity of enzyme catalyzed reactions.

Unit III Lipids **10 hours**
Lipids- Definition, classification and properties. Metabolism- Oxidation and biosynthesis of fatty acids. Definitions- Ketone bodies, ketogenesis and ketosis.

Unit IV Nucleic Acids **8 hours**
Introduction to genetic control of metabolism- Nucleic acids, types, composition, structure, functions, replication and transcription. Elementary knowledge of biosynthesis of protein.

Unit V Buffers, Fluids and Electrolytes **10 hours**
Acid-base balance in normal health, definition of buffers, principles of buffers, major sources of acid produced in the body, physiological buffer system and role of different buffer systems. Fluid and electrolyte balance- Maintenance in normal health.

REFERENCE BOOKS:
1.) Pattabiraman. T.N. Concise text Book of Bio- chemistry, 2nd edition, all India publishers and distributors Regd., 1998.
2.) Deb. A.C., Fundamental of Biochemistry, New centrul book agency (p)Ltd, reprint 2004.
3.) Ambika shanmugam, Fundamentals of biochemistry for Medical students, Karthik printers, 7th edition, 1992.
4.) West ES, Todd WR, Mason HS, Van Bruggen JT (1974) Text book of Biochemistry, 4th Ed., Amerind Publ. Co. Pvt. Ltd.
5.) Lehninger AL, Nelson DL, Cox MM (1993) Principles of Bio Chemistry, 2nd Ed., CBS Publ., and distributors.
6.) Devlin TM (1986) Textbook of Biochemistry with clinical correlations, 2nd Ed., John Wiley & Sons.
7.) Stryer L (1995) Biochemistry, Freeman WH and Co.
8.) Jain JL (2012), Fundamentals of Biochemistry, S. Chand and Company Ltd.

COURSE NAME: FOOD PROCESSING AND PRESERVATION - THEORY **28 HOURS**
COURSE CODE: FND32107
CONTACT: 2L
CREDITS: 2

COURSE OBJECTIVES: The course will enable the students to
1.) To enable students to learn different methods of processing of plant and animal derived foods.
2.) To understand the principles of food preservation and acquire skills in methods of food preservation.

Unit I Food Processing and Preservation **8 hours**
Principles of food processing and preservation- Preservation by Low and high temperatures, Canning, osmotic pressure, dehydration & drying, Irradiation. Use of Preservatives, Food additives, Definition, types, importance and industrial uses of Food additives.
Unit II Cereals, Legumes, Nuts and Oilseeds **5 hours**
Different methods of processing of cereals, legumes, nuts and oilseeds.
Unit III Milk and Milk Products **5 hours**
Different methods of processing of milk & milk products.
Unit IV Fruits and Vegetables **5 hours**
Different methods of fruits and vegetable processing.
Unit V Animal Foods **5 hours**
Different methods of processing of animal foods.

REFERENCE BOOKS:
1.) Sri Lakshmi B (2004) Food Science. New Age Int.
2.) Pecham GG, Foundation of food preparation.1972. Mac millan Pbs.
3.) Subbulakshmi G and Udipi A. 2004. Food Processing and Preservation techniques. New Age Int. 55.
4.) Swaminathan M (1992) Handbook of Food Science and Experimental foods. 2 nd Ed. Bangalore.
5.) Potter NH and Hotchkiss JH (1996) Food Science. 5th ed.. New Delhi, CBS Publications.
6.) Sethi M and Rao SE (2001) Food science experiments and application. CBS pbs. New Delhi.

COURSE NAME: BASIC FOOD SCIENCE – THEORY **28 HOURS**
COURSE CODE: FND32109
CONTACT: 2L
CREDITS: 2

COURSE OBJECTIVES: The course will enable the students to
1.) Learn the composition of various foods.
2.) Study the effects of cooking on nutritive value.

Unit I Food Science **6 hours**
Introduction to food science- functions of food, food guide based on basic five food groups, cooking – objectives and methods.
Unit II Cereals **5 hours**
Cereals- Composition and nutritive value of rice and wheat. Best method of cooking, loss of nutrients during cooking; Advantages of par boiling.
Unit III Pulses **5 hours**
Pulses - Composition, nutritive value, best method of cooking, loss of nutrients during cooking, germination and its advantages.
Unit IV Vegetables **6 hours**
Vegetables – Classification, nutritive value, loss of nutrients during cooking and methods of reducing nutrient loss during cooking.
Unit V Fruits **6 hours**
Fruits- Classification, nutritive value and changes during ripening. Fleshy foods- Meat, fish, egg and milk: Nutritive value.

REFERENCE BOOKS:

1.) Sumathi R. Mudambi, Shalini M. Rao, M.V. Rajagopal Food Science, revised second edition, New Age International (p) Limited, Publishers New Delhi, reprint – 2006.
2.) N. Swaminathan, Food Science and Experimental foods, The Bangalore printing and publishing Co. Ltd. Bangalore, 1992.
3.) B. Srilakshmi, Food Science, New Age international (P) Ltd, New Delhi, Reprint 2006.
4.) N. Shakuntala Manay, M. Shadaksharaswamy, Foods – Facts and Principles. 2nd Edition. New Age International (P) Ltd, New Delhi, Reprint 2005.

COURSE NAME: INTER - DISCIPLINARY PROJECT
COURSE CODE: IDP14001
CONTACT: 0
CREDITS: 3

COURSE NAME: COMMUNITY SERVICE
COURSE CODE: SOC14001
CONTACT: 0
CREDITS: 1

LEARNING OBJECTIVES

1. To familiarise the students on the concept‘giving back to the society’.
2. To familiarize the students on the issues faced by marginalized communities.
3. To provide an experiential platform to the students on any one or two issues as an internship.

CATALOG DESCRIPTION

Along with Intelligent Quotient, it is important for students to enhance their Emotional Quotient as well. The Social Internship offers opportunity to the student to be empathetic towards social issues facing our society. To help and support the affected community / cause through a field internship is the essence of the course in ‘giving back to the society’.

COURSE CONTENT

Unit I:

Introduction to the course. A brief on social issues facing the society with both global and Indian examples.

Unit II:

Minimum 24 hours of field work on a social issue and helping the marginalized / affected community / cause with photographs and testimonies.

Unit III:

Submission of individual reflection on the social service rendered.

The benefits that accrue to the students are

A.) Subjective

1. Psychosomatic benefits: Volunteering increases overall life satisfaction and also helps to relive stress and acts as an anti-depressant.
2. Intellectual benefits: Enhances knowledge through new experiences, and develops communication skills.
3. Career benefits : Enhances career prospects by acquisition of work-related skills, builds good references for employers and provides a forum to network with future potential employers. It also The experience allows gained helps students to take up leadership positions. Letters of recommendation can also be easily sought. Research shows that students who indulge in volunteer word perform better in studies as it invigorates their passion for learning
4. Personal benefits : Real world skills like leadership, problem-solving, collaboration with others, time management and communication skills, learn patience and empathy.
5. Connect learning to real world and enables deeper and lifelong learning.

B.) Community

1. Collective benefits: Strong interpersonal bonds are created, and leads to increased civic and social awareness and responsibility.

Further Reading:

1. Tadevosyan, Gohar&Schoenhuth, Michael. Participatory Research Approach : Principles, Challenges and Perspectives. http://ysu.am/files/01G_Tadevosyan_M_Schoenhuth.pdf
2. Bergold, Jarg& Thomas Stefan. Participatory Research Methods: A Methodological Approach in Motion http://www.qualitative-research.net/index.php/fqs/article/view/1801/3334

PLAN OF WORK

1. Reading on social issues facing the society with both global and Indian examples.
2. Selecting an issue where the student wishes to contribute and wants to make a difference.
3. **Areas** - The internship may be broadly completed by getting in touch with NGO in your city / town / Police / Municipal Corporation / Local Gram Panchayat / Hospital / State Health Department / Women & Child Development Centre / CSR departments of Corporates /school / Old Age Home / Orphanage / Literacy Drive / Aanganwadi Centres / etc.
4. **Online Discussion** – Throughdiscussion, students elaborate their preferred area of work with reference to the Global Scenario and India. Reason for choosing that area also needs and resources of the people in their area of Social Internship and also submit the testimonials, which include signature of the authority where students initiated theirwork, or the signature of the authority in whose area students are currently working or photographs of work (photographs must include students working).
5. **Final Report Submission -** Submission of theTestimonials include signatures of the authorities you have worked with, or the signature of the authority in whose area you have worked or photographs of your work (photographs must include you working). Students' accomplishment in their area of operation along with the major successes student experienced and major challenges faced.
6. Students will submit the complete elaborated report along with testimonials and completion certificate in the form of signed Template

• The registration for all students will open twice, during winter and summer breaks. They may enroll for the internship in either of the two breaks.

• The student will have to submit a continuous record of their 10 to 15 days internship in the form of photographs and testimonies (wherever required).

COURSE NAME: PRINCIPLES OF NUTRITION - PRACTICAL **2 HOURS/WEEK**
COURSE CODE: FND32201
CONTACT: 2P
CREDITS: 1

1. Food Groups and My plate.
2. Menu Planning.
3. RDA Table.
4. Plan and calculate one day menu for an adult woman mentioning the portion size and nutritive value of each.
5. Study of the nutritive foods supplied by the government through ICDS projects during the current 5 year plan.
6. Preparation and calculation of nutritive values of low cost weaning foods.
7. Planning and preparing diet for low, medium and high income groups of sedentary life style.

REFERENCE BOOKS:

1) Swaminathan, M., Essentials of food and Nutrition, Vol I & II, Bappco Publishers, Madras 2000.
2) Srilakshmi. B., Nutrition Science, New age International (p) ltd, publishers, 2004.
3) Frances sizer and Ellie whitney, Nutrition Concepts and Controversies, Thomson wadsworth Publisher, New York, 2006.
4) Mangale Kango, Normal Nutrition, Curing Diseases through Diet, CBS publication, First edition, 2005.
5) Bonnie, Worthington – Roberts and Sue Rodwell Williams, Nutrition throughout the life cycle, 3rd edition, WCB/MC Graw Hill Publisher, New York, 1996.
6) Paul. S., Text of Bio Nutrition Fundamental and Management, RBSA Publishers, 2003

COURSE NAME: DIETETICS – I – PRACTICAL **2 HOURS/WEEK**
COURSE CODE: FND32203
CONTACT: 2P
CREDITS: 1

1.) Planning and preparing diets for diarrhea, constipation.
2.) Planning and preparing diets for febrile conditions -Typhoid and Tuberculosis.
3.) Planning and preparing diets for obese and underweight patients.
4.) Planning and preparing diet for Peptic Ulcer patients.
5.) Planning and preparing diets for viral hepatitis and cirrhosis of liver.
6.) Planning and preparing diets for hyper cholestrolemia.
7.) Planning and preparing diets for hypertensive patients.

REFERENCE BOOKS:

7.) Antia, F.P. (2005): Clinical Nutrition and Dietetics, Oxford University Press, Delhi.
8.) Mahan, L.K., Arlin, M.T. (2000): Krause's Food, Nutrition and Diet therapy, 11th edition, W.B.Saunders Company, London.
9.) Robinson,C.H;Lawler,M.R.Chenoweth,W.L;andGarwick,A.E(1986):Normal and Shubhangini A Joshi (2002): Nutrition and Dietetics2nd edition, Tata Mc Graw-Hill Publishing Company Limited, New Delhi.
10.) Srilakshmi,B.(2005):Dietetics,5th edition, New Age International(P) Limited Publishers, New Delhi..
11.) Therapeutic Nutrition,17th Ed., Mac Millan Publishing Co.
12.) Williams's (1989): Nutrition and diet Therapy.6th edition. Times Mirror/Mosby College Publishing, St.Louis.

COURSE NAME: NUTRITIONAL BIOCHEMISTRY – PRACTICAL **2 HOURS/WEEK**
COURSE CODE: FND32205
CONTACT: 2P
CREDITS: 1

1.) Qualitative analysis for carbohydrates - Glucose, Fructose, Maltose, Lactose, Sucrose, Starch and Galactose.
2.) Qualitative tests of amino acids and proteins.
3.) Quantitative analysis in blood and serum - Blood glucose, cholesterol, urea.
4.) Enzymes – effect of pH on human salivary α-amylase activity.
5.) Estimation of serum Protein (Biuret Rhethod and Lowry method).
6.) Estimation of blood Glucose (Folin Wu method).
7.) Estimation of Serum inorganic phosphorus (Fiske and SubbaRow method).
8.) Estimation of blood creatinine.
9.) Quantitative analysis of calcium by titrimetry.
10.) Quantitative analysis of vitamin C 2,6 dichloro indophenol dye method.

REFERENCE BOOKS:

1) Pattabiraman. T.N. Concise text Book of Bio- chemistry, 2nd edition, all India publishers and distributors Regd., 1998.
2) Deb. A.C., Fundamental of Biochemistry, New centrul book agency (p)Ltd, reprint 2004.
3) Ambika shanmugam, Fundamentals of biochemistry for Medical students, Karthik printers, 7th edition, 1992.
4) West ES, Todd WR, Mason HS, Van Bruggen JT (1974) Text book of Biochemistry, 4th Ed., Amerind Publ. Co. Pvt. Ltd.
5) Lehninger AL, Nelson DL, Cox MM (1993) Principles of Bio Chemistry, 2nd Ed., CBS Publ., and distributors.
6) Devlin TM (1986) Textbook of Biochemistry with clinical correlations, 2nd Ed., John Wiley & Sons.
7) Stryer L (1995) Biochemistry, Freeman WH and Co.
8) Jain JL (2012), Fundamentals of Biochemistry, S. Chand and Company Ltd.

ADAMAS UNIVERSITY
SCHOOL OF MEDICAL SCIENCES

SEMESTER – IV

SCHOOL OF
MEDICAL SCIENCES

COURSE NAME: DIETETICS - II - THEORY **50 HOURS**
COURSE CODE: FND32102
CONTACT: 3L
CREDITS: 4

COURSE OBJECTIVES: This course will enable the students to
1.) Understand and acknowledge the principles of diet therapy.
2.) Understand the pathology of various diseases and the dietary modifications associated therewith.
3.) Exercise diet counselling.

Unit I Concepts and Principles of Diet Therapy **4 hours**
Objectives and principles of therapeutic diets, modifications of normal diet, types of therapeutic diets, dietician and his role, professional code of ethics of dietitian, introduction to nutritional care, planning and implementation of dietary care. Evaluation of the medical history. Evaluation of patient needs. Dietary counselling. Patient education. Challenges in feeding children at the hospitals.

Unit II Diabetes Mellitus, Cardiovascular and Renal Diseases **16 hours**
Insulin Dependent and Non-Insulin Dependent Diabetes Mellitus- Pathogenesis, causes, symptoms, types, factors affecting, risk factors, diagnosis, complications- hypoglycaemia, diabetic ketoacidosis, fasting hyperglycaemia, macrovascular and microvascular disorders.
Nutritional care and diet planning for Insulin Dependent Diabetes Mellitus and Non-Insulin Dependent Diabetes Mellitus, monitoring of results.
Hypertension, atherosclerosis, arteriosclerosis, congestive heart failure- Pathogenesis, causes, factors affecting, risk factors, diagnosis, complications.
Nutritional care and diet planning in cardiovascular diseases.
Renal diseases- Pathogenesis, causes, complications of nephritis, urolithiasis, kidney failure, glomerulonephritis, nephrotic syndrome.
Nutritional care and diet planning in renal diseases.

Unit III Musculoskeletal Disorders, Food Allergy and Intolerance **8 hours**
Arthritis, osteoporosis, gout- Pathogenesis, causes, complications.
Nutrition care and diet planning in musculoskeletal disorders.
Different types of food allergies and intolerance, tests for allergies.
Nutritional care and diet planning in food allergy and intolerance, elimination diet.

Unit IV Nutrition in Surgical Conditions, Cancer and Burns **12 hours**
Surgical conditions- General considerations, preoperative and postoperative diet.
Burns and their management- fluids and electrolyte replacement, ancillary measures, nutritional therapy.
Cancer- Definition, causes, types, nutritional requirements and nutritional complications.

Unit V Nutraceuticals and dietary counselling **10 hours**
Nutraceuticals in the management of various diseases
Drug and nutrient interactions- Effects of drugs on food intake, effects of nutrients on drugs
Dietary counselling- Clients and counsellors, responsibility of client, characteristics of an ideal counsellor, counselling guidelines, steps involved in counselling.

REFERENCE BOOKS:
1.) Antia, F.P. (2005): Clinical Nutrition and Dietetics, Oxford University Press, Delhi.
2.) Mahan, L.K., Arlin, M.T. (2000): Krause's Food, Nutrition and Diet therapy, 11th edition, W. B. Saunders Company, London.
3.) Robinson, C.H; Lawler, M.R. Chenoweth, W.L; and Garwick, A.E(1986): Normal and Therapeutic Nutrition,17th Ed., Mac Millan Publishing Co.
4.) Shubhangini A Joshi (2002): Nutrition and Dietetics2nd edition, Tata Mc Graw-Hill Publishing Company Limited, New Delhi.
5.) Srilakshmi, B. (2005): Dietetics, 5th edition, New Age International (P) Limited Publishers, New Delhi.
6.) Williams's (1989): Nutrition and diet Therapy.6th edition. Times Mirror/Mosby College Publishing, St. Louis.

COURSE NAME: FOOD TECHNOLOGY - THEORY **50 HOURS**
COURSE CODE: FND32104
CONTACT: 3L
CREDITS: 4

COURSE OBJECTIVES: This course will enable the students to
1.) Understand the basic concepts of food technology.
2.) Gain knowledge about processing of different food items.
3.) Understand the preservation of foods.
4.) Understand packaging technology.

Unit I Concepts of Food Technology 10 hours
Introduction to the concept of food technology, physicochemical properties of food, classification of food groups, Ingredients of food, techniques and equipments for food preservation such as drying, refrigeration, thermal treatments.
Innovative techniques in food processing: Ready-to-eat (RTE), ready-to-serve (RTS), edible coatings, edible film, instant premixes.
Significance of packaging and its various requirements.

Unit II Cereals, Millets, Pulses and Legumes **10 hours**
Processing of cereals and millets, malting, different types of browning, composition of rice obtained by different dehusking methods, milling of rice.
Pulses and legumes- Milling of legumes, processing of pulses,toxic constituents in pulses and its detoxification processes, latest technologies of processing legumes-canning, quick cooking legumes, instant legume powder, legume protein concentrates.

Unit III Fruits, Vegetables, Meat, Fish and Poultry **10 hours**
Enzymatic browning, Post harvest changes occurring in fruits and vegetables – Climacteric rise, horticultural maturity, physiological maturity, physiological changes, physical changes, chemical changes, pathological changes occuring during the storage.
Ageing and tenderizing of meat, storage and preservation, cuts and grades of meat.
Preservation of fish by drying, curing, brining, fermentation.
Preservation of eggs, egg powder, frozen eggs.

Unit IV Food Processing and Preservation Techniques **15 hours**
Introduction to refrigeration and freezing, principles of freezing, types of freezing, introduction to thawing, principles involved in thawing and its effect on food.
Introduction to drying and dehydrationas a means ofpreservation, factors affecting rate of drying, types of driers.
Introduction to food irradiation, kinds of ionizing radiations food irradiation, radiation processing in food industry, safety of irradiated foods, introduction to cold sterilization.
Processing of milk products- Pasteurization, homogenization, drying, packaging, standardization, recombination, reconstitution.

Unit V Packaging Technology **5 hours**
Introduction to packaging technology, materials used in packaging, effects of packaging materials on nutritive value of foods.
Different types of additives used in foods and their advantages and disadvantages.

REFERENCE BOOKS:
1.) Food Technology, Prescott and Proctor.B.B.Mc Graw Hill Book Co., New York, 1937.
2.) Rahman, M.S., Handbook of Food Preservation. MARCEL DEKKER Inc. 1999.

COURSE NAME: COMMUNITY NUTRITION - THEORY **50 HOURS**
COURSE CODE: FND32106
CONTACT: 3L
CREDITS: 4

COURSE OBJECTIVES: This course will enable the students to

1.) Become aware about the nutritional deficiencies of the community specially with respect to vulnerable sections
2.) To find out ways to prevent and control the existing nutritional problems.
3.) Understand the role of national and international agencies in promotion of community health.
4.) To spread awareness related to nutrition education in their community.

Unit I Introduction to Community Nutrition **8 hours**

Concept of community nutrition, malnutrition and its indicatorssuch as infant mortality rate, child mortality rate, maternal mortality rate, birth rate, death rate. Ecology of malnutrition- Dietary factors, economic factors, socio cultural factors and environmental factors.

Special reference to vulnerable sections such as pregnant women, nursing mother, infants, children specially girl child (including adolescents). Common nutritional disorders, prevention and dietary treatment- protein energy malnutrition, vitamin deficiency diseases, anaemia, iodine deficiency disorders and fluorosis.

Unit II Assessment of Nutritional Status **10 hours**

Direct and indirect assessment of community nutritional status and their advantages and disadvantages- Diet surveys and sampling techniques, Anthropometry - Measurement of height, weight, head and chest circumferences, mid upper arm, circumference, skin fold thickness, interpretation of measurements and comparison with standards (National Center for Health Statistics, Indian Council of Medical Research). Biochemical parameters for assessing nutrition status.

Growth charts, charts used in India, WHO chart, reference curve and growth curve.

Unit III Nutrition Education **8 hours**

Introduction, aims and objectives, types and methods of nutrition education, principles of planning, execution and evaluation of nutrition education program; advantages and disadvantages.

Communication methods- Introduction, need, audio-visual aids, teaching aids.

Unit IV Strategies to Improve Community Nutrition **8 hours**

Measures to overcome malnutrition, increased agricultural production and animal husbandry with particular focus on nutritious foods and nutrition gardens, concept of food fortification and enrichment, nutrient supplementation, nutrition intervention programmes.

Immunization and its significance, food borne disorders, infestation, outbreak, prevention and control.

Unit V Nutrition Intervention Programs **16 hours**

Objectives and operation of nutrition intervention programmes in India organized by government for vulnerable sections of the population – School Lunch Programme, CMNMP, ICDS, TINP. National Nutritional Anaemia Prophylaxis Programme, National Prophylaxis Programme against Vitamin A Deficiency Diseases, Goitre Control Programme.

National nutrition policy- thrust areas and implementation at national level and its impact, National Food Security.

Role of National and International organizations for the upliftment of the nutritional status of people – ICAR, ICMR, NIN, CFTRI, FAO, WHO, UNICEF and NNMB.

REFERENCE BOOKS:

1.) Agarwal A.N, Indian Economy, Problems of development and planning, Publications, 1981.
2.) Park J.E. and park K. Text book of preventive and social medicine, Publications, 1994.
3.) B. Srilakshmi, Nutrition Science New Age International (CP) Ltd, New Delhi, 2002.
4.) Mahtab, S. Bamji, N. Pralhadrao, Vinodini Reddy, Text book of Human Nutrition, Oxford and IBIT Publishing co Pvt. Ltd, New Delhi, reprint 1999.
5.) Shukla,P.K., Nutritional problems of India,1982.
6.) Temple, N.J. and Steyn, N. Community Nutrition for Developing Countries Athabasca University Press and UNISA Press 2016.

COURSE NAME: FOOD BIOTECHNOLOGY - THEORY **28 HOURS**
COURSE CODE: FND32108
CONTACT: 2L
CREDITS: 2

COURSE OBJECTIVES: This course will enable the students to
1.) Understand the basic concepts and principles of biotechnology.
2.) Understand the significance and applications of biotechnology in food processing.
3.) Implement the knowledge of biotechnology in the development of new food products.

Unit I Introduction to Biotechnology **7 hours**
Meaning and significance of biotechnology, history of biotechnology, comparison of traditional and modern biotechnology.
Introduction to genomics and proteomics, types and future prospects. Introduction to bioinformatics, sequences and nomenclature. Information sources and uses.
Bioethics and its need, different national and international standards of bioethics.

Unit II Genetically Modified (GM) Foods **3 hours**
GM Foods- Definition and examples, merits and demerits, safety aspects of foods produced by genetic engineering.

Unit III Fermentation and Fermented Food Products **6 hours**
Fermentation and its types, advantages, factors affecting fermentation, batch fermentation and continuous fermentation.
Fermented food products- citric acid, lactic acid, sauerkraut, soya sauce, cheese, bread, wine, beer, oriental fermented foods such as tempeh and tofu.

Unit-IV Enzymes in Food Processing **7 hours**
Enzymes and their function in food processing, significance, industrial applicability of microbial enzymes, production of amylase, lipase and pectinase.
Introduction of immobilized enzymes, principles of enzyme immobilization,types of immobilization techniques, immobilized enzymes involved in food processing and their applications.

Unit V Intellectual Property Rights (IPR) in Biotechnology **5 hours**
Introduction to Intellectual Property Rights, IP laws, TRIPS. Different forms of IPR- patent, design, copyrights, trademarks.
Role of IPR in food biotechnology industry.

REFERENCE BOOKS:

1. Dubey RC (2005) A text book of Biotechnology, S. Chand and company, New Delhi.
2. Tripathy SN (2006) Food biotechnology, Dominant Publ., and Distributors.
3. Kumar HD (2004) A text book of Biotechnology, 2nd Ed., Affiliated East-West Press Pvt. Ltd., New Delhi,
4. Kumaresan V (2005) Biotechnology, Saras Publication.
5. Mary, K. Schmidl and Theodre, P. Labuza, Essentials of functional foods, Culinary and Hospitality Industry Publication Services, 2000.
6. Israel Goldberg, Functional foods, Pharma foods and Nutraceuticals, Culinary and hospitality Industry Publication Services, 2001.
7. Robert Easy Wildman, Handbook of Nutraceuticals and functional foods, Culinary and Hospitality Industry Publication Services, 2001.
8. Owen Pward, Fermentation Biotechnology Principles, Processes and Products, Prentice H New Jersey, 1989.
9. Frazier and West Hoff, Food Microbiology, Tata Mc Graw Hill Publishing Company Ltd, New Delhi, 1995.

COURSE NAME: HUMAN VALUES AND PROFESSIONAL ETHICS
COURSE CODE: PSG11021
CONTACT: 2L
CREDITS: 2

COURSE NAME: INDUSTRY ORIENTED VIVA - VOCE
COURSE CODE: FND32110
CONTACT: 1L
CREDITS: 0

COURSE OBJECTIVES: This will enable the students to
1.) Associate theoretical knowledge with its industrial applicability.
2.) Develop and strengthen their skills and techniques which will help them in building their career.
3.) Get a practical exposure to the work environment in industry.

COURSE NAME: DIETETICS - II - PRACTICAL **2 HOURS/WEEK**
COURSE CODE: FND32202
CONTACT: 2P
CREDITS: 1

1.) Planning, nutritive value calculation and diet preparation for insulin dependent diabetes mellitus.
2.) Planning, nutritive value calculation and diet preparation for non-insulin dependent diabetes mellitus.
3.) Planning, nutritive value calculation and diet preparation for hypertension.
4.) Planning, nutritive value calculation and diet preparation for gout.
5.) Planning, nutritive value calculation and diet preparation for renal failure.
6.) Planning, nutritive value calculation and diet preparation for atherosclerosis.
7.) Planning, nutritive value calculation and diet preparation for coronary heart disease.
8.) Planning, nutritive value calculation and diet preparation for osteoporosis.
9.) Planning, nutritive value calculation and diet preparation for nephritis.
10.) Identification of nutraceuticals and linking them to particular disorders.

REFERENCE BOOKS:
1.) Antia, F.P. (2005): Clinical Nutrition and Dietetics, Oxford University Press, Delhi.
2.) Mahan, L.K., Arlin, M.T. (2000): Krause's Food, Nutrition and Diet therapy, 11th edition, W. B. Saunders Company, London.
3.) Robinson, C.H; Lawler, M.R. Chenoweth, W.L; and Garwick, A.E(1986): Normal and Therapeutic Nutrition,17th Ed., Mac Millan Publishing Co.
4.) Shubhangini A Joshi (2002): Nutrition and Dietetics2nd edition, Tata Mc Graw-Hill Publishing Company Limited, New Delhi.
5.) Srilakshmi, B. (2005): Dietetics, 5th edition, New Age International (P) Limited Publishers, New Delhi.
6.) Williams's (1989): Nutrition and diet Therapy.6th edition. Times Mirror/Mosby College Publishing, St. Louis.

COURSE NAME: FOOD TECHNOLOGY - PRACTICAL **2 HOURS/WEEK**
COURSE CODE: FND32204
CONTACT: 2P
CREDITS: 1

1.) Introduction to basic laboratory instruments and equipments related to food technology.
2.) Development of processed cereal products.
3.) Development of processed meat and fish products.
4.) Survey of processed foods available in market.
5.) Drying of food products.
6.) Freezing of food products.
7.) Study of various types of food packaging materials.
8.) To perform organoleptic testing of food products.
9.) Study of concept of shelf-life of processed and unprocessed food products.
10.) Visit to different food processing industries.

REFERENCE BOOKS:

1.) Food Technology, Prescott and Proctor.B.B.Mc Graw Hill Book Co., New York, 1937.
2.) Rahman, M.S., Handbook of Food Preservation. MARCEL DEKKER Inc. 1999.

COURSE NAME: COMMUNITY NUTRITION - PRACTICAL **2 HOURS/WEEK**
COURSE CODE: FND32206
CONTACT: 2P
CREDITS: 1

1.) Assessment of nutritional status by direct methods such as height, weight, head circumference, chest and mid arm circumference.
2.) Assessment of nutritional status by indirect methods including clinical and biochemical methods.
3.) Identification of vulnerable groups as part of diet and nutrition surveys.
4.) Preparation of visual aids.
5.) Observation of the working of nutrition and health oriented programmes.
6.) Visit to hospitals to observe nutritional deficiencies.
7.) Plotting of growth charts, growth monitoring and promotion.
8.) Understanding the different programs implemented by the government with respect to community health.
9.) Determination of clinical parameters like blood glucose and haemoglobin to monitor the health status.
10.) Study of different signs of nutrient deficiencies such as kwashiorkor, marasmus, vitamin A deficiencies, anaemia, rickets, B-Complex deficiencies and their clinical assessment.
11.) Estimation of food and nutrient intake - Household food consumption data, adult consumption unit, 24 hours dietary recall, 24 hours record.

REFERENCE BOOKS:

1.) Agarwal A.N, Indian Economy, Problems of development and planning, Publications, 1981.
2.) Park J.E. and park K. Text book of preventive and social medicine, Publications, 1994.
3.) B. Srilakshmi, Nutrition Science New Age International (CP) Ltd, New Delhi, 2002.
4.) Mahtab, S. Bamji, N. Pralhadrao, Vinodini Reddy, Text book of Human Nutrition, Oxford and IBIT Publishing co Pvt. Ltd, New Delhi, reprint 1999.
5.) Shukla,P.K., Nutritional problems of India,1982.
6.) Temple, N.J. and Steyn, N. Community Nutrition for Developing Countries Athabasca University Press and UNISA Press 2016.

YEAR – III
SEMESTER – V

SCHOOL OF MEDICAL SCIENCES

COURSE NAME: NUTRITION FOR LIFE SPAN - THEORY **50 HOURS**
COURSE CODE: FND33101
CONTACT: 3L
CREDITS: 4

COURSE OBJECTIVES: This course will enable the students to
1.) Understand the physiology associated withdifferent age groups.
2.) Understand the process of growth and development from birth till old age.
3.) Get familiar with the nutritional needs of different age groups.
4.) To plan menu as per the needs of different age groups.

Unit I Meal Planning **4 hours**
Introduction to meal planning**,** objectives, principles and steps. Factors affecting meal planning.
Balanced diet- Definition and significance as per various age groups, guidelines for planning a balance diet, food pyramid.

Unit II Nutrition in Pregnancy and Lactation **14 hours**
Nutrition in pregnancy- Nutritional requirements, physiological changes associated with pregnancy, stages of embryo development, complications associated with pregnancy. Meal planning for pregnant women.
Nutrition in lactation- Nutritional requirements, physiology associated with lactation, composition of breast milk, influence of hormones, effect of mother's diet on the quality and quantity of milk production, breastfeeding practices. Meal planning for lactating women.

Unit III Nutrition in Infancy and Childhood **15 hours**
Nutrition in infancy- Nutritional requirements, breast feeding, weaning, types of weaning foods and supplementary foods, infant formula, changes in growth pattern - height and weight.Meal planning for infants.
Nutrition in preschool age – Nutritional requirements,eating habits and behaviour, growth, factors hindering increase in height and weight, nutritional associated problems.
Nutrition in school children-Nutritional requirements, factors influencing eating habits, significance of school lunch and mid-day meal program. Meal planning for children.

Unit IV Nutrition in Adolescence **7 hours**
Nutritional requirements, physiological and psychological changes, puberty, menarche, changes in food choices and habits, factors influencing needs, nutritional disorders, psychological and peer group pressure on eating habits.Meal planning for adolescents.

Unit V Nutrition in Adulthood and Old Age **10 hours**
Nutrition in adulthood- Nutritional requirements, physical, mental and social changes affecting meal patterns.Meal planning for adults.
Nutrition in oldage- Nutritional requirements, process of ageing, physical, physiological, biological and psychological changes affecting meal pattern. Dietary changes with special reference to consistency of food. Meal planning for old people.

REFERENCE BOOKS:
1.) Swaminathan, M. Advances text book on book on food and nutrition Vol 1 and 2 Bangalore printing publishing Co., Ltd., Bangalore, II ed., 1988.
2. Fox, B.A., and Cameron, A.G., Food science, nutrition and health, Edward Asnold, London, 1995, VI Edition.,
3. Nato, A.B and Heslin, J.A., Nutritional Care of the adult, Macmillan Publication Co., New York 1986.
4. Antia F.P Clinical Dietetics' and Nutrition, III Edition, Oxford University Press, Bombay 1989.
5. Srilakshmi. B., dietetics, willey Eastem Ltd., NewDelhi, 2003.
6. Robinson C.H., Lawer M.R., Chenowelth. WIC., and Garwich A.E., Normal and therapeutic nutrition, McMillan Publishers Co., Newyork, XVII Edition, 1986.
7. Suitor, C.J.W and Growely, M.F., Nutrition – Principles and application in Health promation, J.B, Lippincott Co., Philadelphia pb, II Edition, 1984.
8. Gopalan, C. and Ramasasthri, B.V., Nutritive Value of Indian foods. NIN (ICMR) 1996.

COURSE NAME: FOOD SERVICE MANAGEMENT - THEORY **50 HOURS**
COURSE CODE: FND33103
CONTACT: 3L
CREDITS: 4

COURSE OBJECTIVES: This course will enable the students to

1.) Understand the various types of food services.
2.) Understand the principles, concepts and functions of food service management.
3.) Become aware about the scope of food service management in commercial and welfare organizations.
4.) Gain knowledge about personnel management, financial management and legal aspects of catering.

Unit I Food Service and Catering Industry **7 hours**

Introduction to catering, Classification of different types of food service institutions in operation as per their function: profit oriented, service oriented and public health facility oriented; Processing method: Conventional, commissary and fast food service systems; Food service: Self service, tray service and waiter-waitress service.

Unit II Floor planning and layout **10 hours**

Features of typical food service facilities.

Work area plan- Receiving, storing, preparation of food, cooking, serving, dining, dishwashing, pot and pan washing, garbage disposal: flow space relationship. Dimensions of work centers.

Equipment – Classification of equipments, factors involved in their selection, utilization and care of major equipments.

Unit III Management and Organization **16 hours**

Definition of management, its principles, tools and techniques.

Leadership, qualities of a good leader, styles of leadership, art of delegation. Principles of organization, process, types of organization,tools of management. Utilization of computers in food service establishments.

Personnel Management- Sources of personnel, Criteria for selection of food service staff, orientation, training, motivation, supervision, significance of good human relations, employee facilities, fringe benefits. Labour laws governing food service establishments, performance appraisal of employees.

Financial management-Principles and methods of food cost control, factors influencing food cost, labor cost, operating cost, overhead cost. Book keeping and accounting – systems of book keeping, book of account maintenance of account books, balance sheets, budgetary control.

Unit IV Quantity food preparation **7 hours**

Selection, purchasing methods and storage of foods.

Definition of menu planning, principles involvedand types of menus.

Standardization of recipe – Definition, standard recipe format and utility.

Definition of standard portion size, portioning equipments and portion control.

Use of left over foods.

Unit V Hygiene, Sanitation and Safety in Food Service Institutions **10 hours**

Definition and significance, hygiene in handling of food, personnel hygiene of personnel,significance of waste disposal, pest and rodent control in food services, control of microbial quality of food, prevention of food borne diseases, personal hygiene, environmental sanitation, Standards for food safety and sanitation

Safety- Accidents in food service institutions and establishments, safety procedure, training and education, legal responsibilities of food service manager.

REFERENCE BOOKS:

1.) Sethi, M. and Matha, S. Catering Management – An Integrated approach, Wiley Eastern Ltd., New Delhi, II Edition 1993.

2.) Branson, J.C. and Lennon, M.Hotel, Hostel and Hospital Housekeeping, EiLBS (Publication) V Edition 1992.

3.) Palacio, J.P. Harger, V., Shugart, G. and Theis, M. West's Introduction to food service, MacMillan Publication Co., New York, XVII Edition, 1944.

4.) Kotschevar, L.H. and Teerell, M.E., Food service planning, Layout and Equipment, MacMillan Publication co., New York, III Edition, 1985.
5.) Splaver, B.R. Successful Catering, Van Norstrand Reinhold, New York, III Edition, 1985.
6.) Kinton, R and Cesarani, V., The Theory of Catering ELBS, VII Edition, 1992.

COURSE NAME: FOOD PRODUCT DEVELOPMENT AND QUALITY CONTROL – THEORY 50 HOURS
COURSE CODE: FND33105
CONTACT: 3L
CREDITS: 4

COURSE OBJECTIVES: This course will enable the students to
1.) Understand the principles and concepts of food product development.
2.) Become aware about the quality control of food products and common standards associated therewith.
3.) Understand the process of development of food products.

Unit I New Food Product **5 hours**
Introduction and definition, classification, factors defining new product development: social and health concern, impact of market place influence and technology.

Unit II Product Development **15 hours**
Phases in new food product development, product management and planning. Standardization methods. Portion size and portion control.Methods of calculation of nutritive value and production cost. Shelf life and storage, stability testing methods.

Unit III Product Evaluation and Packaging **10 hours**
Development of score card and data analysis. Selection and training of judges.
Suitability of packaging, development of packages and labelling.

Unit IV Food Quality Control and Quality Assurance 10 hours
Objectives of quality control, significance, functions, different stages of quality control in food industry.
Objectives of quality assurance, design of quality assurance program of a company and microbiological issues.
Maintaining supply chain quality and marketing of food products.

Unit V Government Regulations in Quality Control 10 hours
Detailed study of FAO/WHO Codex Alimentarious Commission, PFA, AGMARK, BIS, FPO, Fair Average Quality (FAQ), specifications for food grains, ISO 9000 series.
Hazard Analysis and Critical Control Point (HACCP) –Background and introduction, principles, advantages and limitations.
Consumer Protection Act (CPA)
Introduction to food adulteration, common adulterants, tests for the identification of common adulterants.

REFERENCE BOOKS:
1.) A.Y.Sathe, A first course in food analysis –New Age Publications, 1999.
2.) Norman. N. Potter & Joseph. H. Hotchkiss, Food Science –CBS Publishers, 1996.
3.) M. Swaminathan, Food science, Chemistry & Experimental Foods –Bappco Publishers.
4.) BIS standards.
5.) Desrosier And Desrosier, Technology of food preservation –CBS Publishers, Fourth edition, 1999.

COURSE NAME: SCIENCE OF BAKERY AND CONFECTIONARY **28 HOURS**
COURSE CODE: FND33107
CONTACT: 1L
CREDITS: 2

COURSE OBJECTIVES: This course will enable the students to
1.) Understand the principles and techniques involved in bakery.
2.) Understand the significance of bakery and confectionary.
3.) Gain skills for setting up of a bakery and confectionary unit.

Unit I Bakery **6 hours**
Introduction and principles of baking, overview of baking industry in India, raw materials including the essential and optional ingredients required in baking, structure and composition of wheat kernel, wheat milling, types of wheat flour, ideal features of good quality, enrichment of flour and bread, methods of making batters and doughs, classification of baked foods.

Unit II Baking Ingredients **6 hours**
Various ingredients and their role in baking- Flour, water, yeast, sugar, shortening, milk, eggs, moisturising agents,butter, salt, spices, flavourings, fruits and nuts, food colours, setting materials, cocoa and chocolate,
Recipe balance in baking, methods of storage of baked products,selection of packaging materials.
Leavening agents-Introduction, different leavening agents-physical, chemical and biological and their role in baking.

Unit III Setting up a Bakery Unit **4 hours**
Consideration of factors for setting up a bakery unit, different types of ovens used in bakery, construction and working of conventional and modern ovens, equipments needed for starting a small bakery unit, classification of equipments and their description, types, materials, usage, maintenance.

Unit IV Preparation and Decoration of Baked Foods **8 hours**
Steps and procedures involved in break making, function of differentingredients, types of breads, ideal qualities of a good loaf, identification and remedying of bread faults, bread improvers.
Ingredients of cake making and their functions, methods of cake mixing, types of cakes, cake judging, preparation of cakes, cake faults and remedies.
Ingredients involved in biscuit, pastry and cookie making. Nutritive value, procedure of preparation, essentials in making good biscuits and pastries.
Icing- Types and techniques, frosting and fillings. Evaluation of baked products- objective and subjective methods.

Unit V Confectionary **4 hours**
Processing of cocoa and chocolate, making of toffee, chocolates, fruit drops, hard boiled candies, soft candies, bars, chewing gums.
Special confectionery foods, functions of major components, factors influencing the quality of the product.

REFERENCE BOOKS:
1.) Dubey, S.C. (2002), Basic Baking IV Edition, The Society of Indian Bakers, New Delhi.
2.) Bakers Handbook on Practical Baking (1998) Compiled and Published by US Wheat Associates, New Delhi.
3.) NIR Board, The Complete Technology Book on Bakery Products, National Institute of Industrial Research, New Delhi.
4.) Fellows, J.P. (1998), Food Processing Technology – Principles and Practice, Ellis Horword Limited, London.
5.) Avantina Sharma, (2006), Text Book of Food Science and Technology, International Book Distributing Co., Chaman Studio Building, Charbagh, Lucknow, UP.

COURSE NAME: INDUSTRY ORIENTED VIVA - VOCE
COURSE CODE: FND33109
CONTACT: 1L
CREDITS: 0

COURSE OBJECTIVES: This will enable the students to
1.) Associate theoretical knowledge with its industrial applicability.
2.) Develop and strengthen their skills and techniques which will help them in building their career.
3.) Get a practical exposure to the work environment in industry.

COURSE NAME: NUTRITION FOR LIFE SPAN - PRACTICAL **2 HOURS/WEEK**
COURSE CODE: FND33201
CONTACT: 2P
CREDITS: 1

1.) Planning, preparation and serving of a meal as per family income- low income, middle income and high income.
2.) Planning, preparation and serving of a meal for an infant.
3.) Planning, preparation and serving of an indigenous weaning mix.
4.) Planning, preparation and serving of a meal for a pregnant woman.
5.) Planning, preparation and serving of a meal for a lactating woman.
6.) Planning, preparation and serving of a meal for a toddler.
7.) Planning, preparation and serving of a meal for a school going child.
8.) Planning, preparation and serving of a meal for an adolescent.
9.) Planning, preparation and serving of a meal for an old aged person.
10.) Planning and preparation of any five packed lunches.

REFERENCE BOOKS:

1.) Swaminathan, M. Advances text book on book on food and nutrition Vol 1 and 2 Bangalore printing publishing Co., Ltd., Bangalore, II ed., 1988.
2. Fox, B.A., and Cameron, A.G., Food science, nutrition and health, Edward Asnold, London, 1995, VI Edition.,
3. Nato, A.B and Heslin, J.A., Nutritional Care of the adult, Macmillan Publication Co., New York 1986.
4. Antia F.P Clinical Dietetics' and Nutrition, III Edition, Oxford University Press, Bombay 1989.
5. Srilakshmi. B., dietetics, willey Eastem Ltd., NewDelhi, 2003.
6. Robinson C.H., Lawer M.R., Chenowelth. WIC., and Garwich A.E., Normal and therapeutic nutrition, McMillan Publishers Co., Newyork, XVII Edition, 1986.
7. Suitor, C.J.W and Growely, M.F., Nutrition – Principles and application in Health promation, J.B, Lippincott Co., Philadelphia pb, II Edition, 1984.
8. Gopalan, C. and Ramasasthri, B.V., Nutritive Value of Indian foods. NIN (ICMR) 1996.

COURSE NAME: FOOD SERVICE MANAGEMENT - PRACTICAL **2 HOURS/WEEK**
COURSE CODE: FND33203
CONTACT: 2P
CREDITS: 1

1.) Standardization of at least 2 recipes in each of the following categories:
a. Cereal and cereal products
b. Vegetables.
c. Fruits.
d. Meat, chicken and other fleshy foods
e. Sugar and jaggery
f. Milk and its products
g. Pulses
h. Nuts and oil seeds
2.) Planning and preparation of menu for various occasions.
3.) Preparation of quantity recipes for 20 persons with a main dish, 2 side accompaniments and a dessert/soup.
4.) Visit to catering establishments (1 in each category)-welfare, commercial and transport catering.

REFERENCE BOOKS:

1.) Sethi, M. and Matha, S. Catering Management – An Integrated approach, Wiley Eastern Ltd., New Delhi, II Edition 1993.
2.) Branson, J.C. and Lennon, M.Hotel, Hostel and Hospital Housekeeping, EiLBS (Publication) V Edition 1992.
3.) Palacio, J.P. Harger, V., Shugart, G. and Theis, M. West's Introduction to food service, MacMillan Publication Co., New York, XVII Edition, 1944.
4.) Kotschevar, L.H. and Teerell, M.E., Food service planning, Layout and Equipment, MacMillan Publication co., New York, III Edition, 1985.
5.) Splaver, B.R. Successful Catering, Van Norstrand Reinhold, New York, III Edition, 1985.
6.) Kinton, R and Cesarani, V., The Theory of Catering ELBS, VII Edition, 1992.
7.) Lillicap, D.R and Cousins, J.A. Food and Beverage Service, ELBS, IV Edition, 1994.
8.) Maris, M, McCreery, C and Brighton, R. Introduction to catering, Blackwill Scientific Publications, London, 1993.
9.) Delfakis, H. Scanion, W.C. and Van Burch, J.B. Food service Management, South Wertern Publication Co., cincinattti, ohio, 1992.
10.) Cracknell, H.C. and Nobis, G. Mastering Restaurant Service, Macmillan Master Service, Macmillan Education Ltd, (pub) London, 1989.

SCHOOL OF MEDICAL SCIENCES

SEMESTER – VI

SCHOOL OF
MEDICAL SCIENCES

COURSE NAME: DIET THERAPY AND COUNSELLING - THEORY **50 HOURS**
COURSE CODE: FND33102
CONTACT: 3L
CREDITS: 4

COURSE OBJECTIVES: This course will enable the students to

1.) Gain knowledge about the principles and concepts of nutritional or diet counselling.
2.) Understand the role of a dietitian in healthcare.
3.) Make requisite dietary modifications as per the various disease conditions and provide counselling to the patient based on the pathophysiology.
4.) Make use of computers to collect and analyse information.

Unit I Nutritional Care for Metabolic Disorders **10 hours**

Diabetes mellitus and its types, etiology, symptoms, metabolic changes in diabetes mellitus and its dietary management.

Causes, symptoms and dietary management of gout, phenylketonuria, lactose intolerance, hypothyroidism and hyperthyroidism.

Unit II Nutritional Care for Diseases of Cardiovascular and Renal Systems **12 hours**

Etiology, symptoms and dietary management of hypertension, hyperlipidaemia, atherosclerosis, coronary heart disease, congestive heart failure. Dietary fatsand their role in the development of cardiovascular diseases.

Etiology, symptoms and dietary management of nephritis, nephrotic syndrome, nephrolithiasis, renal failure.

Unit III Nutritional care for Cancer, AIDS, Food Allergy, Surgery and Burns **8 hours**

Causative and risk factors associated with cancer and AIDS, chronic complications and different stages, dietary modifications.

Diagnosis and treatment of food allergy.

Physiological changes, nutritional care and management associated with surgery, trauma and burns.

Food exchange list in diet planning.

Unit IV Nutrition Counselling **10 hours**

Introduction and definition, objectives and expectations, scope and limitations. Patient education and counselling- Analysis of patient needs, factors to be considered in providing dietary advice and counselling, consideration of behaviour modification, motivation, communication of dietary advice and establishment of rapport, counselling relationship, aids to counselling.

Dietitian and types, code of ethics, responsibilities of a dietitian.

Counselling- Process and techniques to get relevant information such as clinical information, medical history, general profile, nutritional assessment.

Unit V Dietary Counselling **10 hours**

Evaluating food and nutrient intake, lifestyle, physical activity, stress. Counselling the client, client concurrence, co-ordination of care plans.

Evaluation- Assessment of the success of client performance and evaluation of the counselling process.

Use of computers by dietitian, dietary computations, dietetic management, education and training, information storage and administration, research, implementation of software packages. Straight line, frequency table, bar diagram, pie chart, preparation of patient dietary charts. Statistical calculations such as mean, median and standard deviation.

REFERENCE BOOKS:

1.) Joshi, S.A., Nutrition and Dietetics, Tata McGraw Hill Publications, New Delhi, 2004.
2. Srilakshmi B., Dietetics, New Age International (P) limited Publications, 2004.
3.) Antia FP (2008) Clinical dietetics and nutrition., Oxford University Press, New Delhi.
4.) Mahan LK, Escott-Stump S (2000). Krause's Food Nutrition and Diet Therapy 10th Ed., W.B. Saunders Ltd.
5.) Zeeman, FJ. (1998) Applications of clinical nutrition. Englewood cliffs: Prentice Hall International Inc.
6.) Thomas B (1995) Blackwell Manual of Dietetic practise, 2nd Ed., Oxford: New York, 1995.
7.) Robinson (2006) Normal and therapeutic nutrition, Macmillan Pub. Company New York.

8.) Mudambi SR, Rajagopal MV (2015) Fundamental of food, nutrition and diet therapy. New age International Publ., New Delhi.
9.) Srilakshmi B (2014) Dietetics, New age international Publ., New Delhi.
10.) Williams, S.R. Nutrition and Diet therapy, Times Mirror/Mosby College Publishing, St. Louis, seventh edition, 2000.
11.) Raheena, Begum, A textbook of Foods, Nutrition and Dietetics, Sterling Publishers, New Delhi, 1989.

COURSE NAME: FOOD PRESERVATION - THEORY **50 HOURS**
COURSE CODE: FND33104
CONTACT: 3L
CREDITS: 4
COURSE OBJECTIVES: This course will enable the students to
1.) Know about the principles of food preservation.
2.) Understand the significance of food preservation.
3.) Understand the different techniques and methods of preservation.
4.) Acquire skills in methods of food preservation.

Unit I Food Preservation **8 hours**
Significance and need, principles and methods. Scope of preservation of fruits and vegetables in India.
Food spoilage- Role ofmicroorganisms, enzymes, insects, parasites and rodents, environmental factors and measures to control them. Classification of foods by ease of spoilage.Methods of prevention of food spoilage.

Unit II Methods of Food Preservation **15 hours**
Asepsis, methods for removal of microorganisms such as clarification, filtration, centrifugation, thermal processing (blanching, pasteurization, sterilization and microbial death time), food drying and dehydration,cooling and freezing, food preservation using chemicals, irradiation and other emerging techniques (Controlled Atmosphere Packaging, Modified Atmosphere Packaging, genetic engineering).

Unit III Preservation with High Concentrations **12 hours**
Concept of food concentration, sugar concentrates. Preparation of jam, jellies, marmalade and problems associated therewith, tests of doneness. Crystallized and glazed fruits, squashes and syrups- definition, preservation, preparation, temperature test for syrups and candies. Fruit beverages.
Salt concentrates, functions of ingredients in the preparation of pickles, types of pickles, chutneys, sauces, ketchups, preparation of sauerkraut, dill and common Indian pickles.

Unit IV Canning of Fruits and Vegetables **10 hours**
Introduction, can manufacture, canning process and steps, merits and demerits, selection of fruits and vegetables, grading, washing, peeling, cutting, blanching, cooling, filling, exhausting, sealing, processing, cooling and storage, types of canning such as pressure canning and water bath canning, spoilage of canned food.

Unit V Preservation with Chemicals **5 hours**
Introduction, characteristics of chemical preservatives, classification, organic and inorganic preservatives- types and mode of action, use. Natural preservatives, antibiotics, antioxidants, anti-browning, cleaning, sanitizing and fungicidal agents – mode of action and uses. Health impacts due to excessive use of chemical preservatives.

REFERENCE BOOKS:
1.) Frazier WC, Westoff DC (1998) Food Microbiology 4th Ed., Tata Mc Graw Hill Publ. Co. Ltd.
2.) Prescott SC, Proctor BE (1937) Food Technology, McGraw Hill.
3.) Desroier NV (1963) The technology of food preservation, AVI Pub. Co.
4.) Lal G, Siddappa GS, Tandon GL (1960) Preservation of food and vegetables, ICAR, New Delhi.
5.) Manay NS, Shadaksharaswamy M (2010) Foods - Facts and principles, New Age International Publ., New Delhi.
6.) Potter NN, Hotchkiss JH (1966) Food Science, 5th Ed., CBS Publisher and Distributors, Delhi.
7.) Johnson R, Anderson MT (2012) Food Preservation.

8.) Srivastava, R. P. and Kumar, S. (1998). Fruit and Vegetable preservation –Principles and practices. CBS Publishers and Distributors, New Delhi.
9.) Desrosier, N.W. and Desrosier, J.N. (1987). The Technology of Food Preservation. CBS Publishers and Distributors, New Delhi.

COURSE NAME: NUTRITION FOR HEALTH AND FITNESS - THEORY **28 HOURS/WEEK**
COURSE CODE: FND33106
CONTACT: 2L
CREDITS: 2

COURSE OBJECTIVES: This course will enable the students to
1.) Understand the significance of health and fitness.
2.) Understand the interaction between fitness and nutrition.
3.) Know the different types of exercises.
4.) Manage stress.

Unit I Health **5 hours**
Health and its concept, definitions and dimensions of health, concept of well-being, spectrum and determinants of health, ecology of health, right to health, responsibility for health and measuring indicators of health.
Unit II Nutrition for Physical Activity **6 hours**
Introduction to food groups, MyPyramid (FAO/WHO, 2005), appropriatediet and its significance, functions of macronutrients and micronutrients, optimum nutrition and hydration.
Unit III Exercise and Health Related Fitness **8 hours**
Health related fitness, health promotion and physical activity for health benefits.Role of nutrition in sports and nutrition to athletic performance.Resistance exercise training, aerobic and anaerobic exercises, benefits of fitness training and gadgets for measuring physical activity.
Unit IV Diseases Linked toWrong Food Habits and Physical Inactivity **4 hours**
Lifestyle disorders,non communicable disease conditions such asunderweight, obesity, diabetes mellitus, hypertension, cancer, cardiovascular disease, anaemia.
Unit V Exercise, Stress and Health Management **5 hours**
Stress assessment and management techniques-Exercise at medium and high altitudes, underweight, overweight and obesity, relaxation techniques, yoga and meditation, clinical exercise physiology for cancer, cardiovascular and pulmonary rehabilitation.

REFERENCE BOOKS:
1. K. Park Test book of preventive and social medicine, 15th edition, MIS Banarsidas Bhano Publishers, Jabalpur, 1997.
2. Melvin H. Williams, Nutrition for Health, fitness and Sports, 7th edition, MC Graw Hill international Edition, 2005.
3. Michael J.GIbney, lan A Macdonald and Helen M.Roche, Nutrition and Metabolism, Blackwell Publishing company, Bangalore, Reprint 2004.
4. Werner W. K Hoejer (1989), Life time Physical Fitness and Wellness, Morton Publishing Company, Colorado.
5. Mishra, S. C (2005) Physiology in Sports. Sports Publication, New Delhi.
6. 3. Greenberg, S. J and Pargman, D (1989) Physical Fitness – A Wellness Approach Prentice Hall International (UK) Limited, London.
7. 4. Swaminathan T, (2008) Essentials of Food and Nutrition Bangalore Printing Publishing Co.
8. McArdle, W. D, Frank I. Katch, F. I and Victor L. Katch (1996) Exercise Nutrition: Energy Nutrition and Human Performance. William & Wilkin Publishing USA.
9. Mahan, K and Stump, E. S (1996) Krause Food and Nutrition and Diet Therapy W.B Saunders Company, USA.

COURSE NAME: FOOD SANITATION AND HYGIENE - THEORY **28 HOURS**
COURSE CODE: FND33108
CONTACT: 2L
CREDITS: 2

COURSE OBJECTIVES: This course will enable the students to
1.) Understand the various aspects of hygiene and sanitation.
2.) Know about food contamination and poisoning.
3.) Understand the various methods of sanitation.

Unit I Sanitation **4 hours**
Introduction and meaning, general principles of food hygiene,pattern of microbial growth, factors influencing the proliferation of microorganisms. Evaluation of microbial load by total plate count technique, press plate technique, indicator or dye reduction test.

Unit II Contamination **8 hours**
Food contamination. Types of contamination such as bacterial, physical and chemical.
Methods of protection against contamination.
Food Poisoning. Common types of food poisoning including *Salmonella*,*Clostridium perfringens*, botulism, *Staphylococcus* and their symptoms. Different food borne diseases such as amoebiasis, acute diarrhoea and dysentery, typhoid. Methods of prevention of food poisoning, cross contamination in food plants.
Ways of killing microorganisms by using heat, chemicals and radiation. Methods to inhibitmicrobial growth by refrigeration, chemicals, dehydration and fermentation.

Unit III Sanitation **8 hours**
Cleaning agents and their ideal characteristics, selection and classification. Sanitizersincluding thermal sanitizing and chemical sanitizing. Introduction to food service sanitation, steps involved in cleaning, cleaning of equipments, mechanized cleaning and sanitizing.GMP & GLP and sanitary aspects of building and equipment. Sources of water and its contamination, significance of water purification, various methods of purification, potable water, standards of water quality, water quality criteria, sanitary aspects of water supply.

Unit IV Waste Disposal **3 hours**
Solid waste disposal, waste water handling and water sewage treatment- pretreatment, primary, secondary and tertiary treatment, disinfection.

Unit V Personnel Health and Hygiene **5 hours**
Introduction, need and significance (hands and skin, hair, nose, mouth and ears, cuts, boils etc.), medical checkups, Habits, importance of rest, exercise and recreation. Hygienic practices of personnel, personal hygiene and its association with food product contamination,ways of disease transmission. Equipment for personal hygiene, protective clothing.

REFERENCE BOOKS:
1.)Roday, S. Food Hygiene & Sanitation. Tata McGraw-Hill Education, 2011.
2.)Marriott, G. Norman, Principles of food sanitation, Van Nostrand Reinhold company, New York, 1985.
3.)Sethi, M. and Matha, S., Catering management- An integrated approach, Wiley Eastern Ltd., New Delhi, 1993.
4.)Johns N (1991) Managing Food Hygiene, Palgrave Macmillan.
5.)Sprenger RA (2000) The Food Hygiene Handbook, High Field Publication.
6.)Park K (2015) Park Textbook of preventive & social medicine 24th Ed., Banarsidas Bhanot Publ.
7.)Bedi YP (1977) A handbook of social and preventive medicine, Anand Publ.

COURSE NAME: DIET THERAPY AND COUNSELLING - PRACTICAL 2 HOURS/WEEK
COURSE CODE: FND33202
CONTACT: 2P
CREDITS: 1

1.) Planning, preparation and calculation of diets for insulin dependent diabetes mellitus.
2.) Planning, preparation and calculation of diets for non-insulin dependent diabetes mellitus.
3.) Planning, snacks, desserts and beverages for diabetes.
4.) Planning, preparation and calculation of diets for cardiovascular diseases.
5.) Planning, preparations and calculation of diet in renal failure, renal complicationsand kidney stones.
6.) Planning, preparations and calculation of diet in cancer.
7.) Planning, preparations and calculation of diet in AIDS.
8.) Planning, preparations and calculation of diet in surgery.
9.) Planning, preparations and calculation of diet in burns.
10.) Distribution of food from kitchen to individual patient with specific diet.

REFERENCE BOOKS:

1.) Joshi, S.A., Nutrition and Dietetics, Tata McGraw Hill Publications, New Delhi, 2004.
2. Srilakshmi B., Dietetics, New Age International (P) limited Publications, 2004.
3.) Antia FP (2008) Clinical dietetics and nutrition., Oxford University Press, New Delhi.
4.) Mahan LK, Escott-Stump S (2000). Krause's Food Nutrition and Diet Therapy 10th Ed., W.B. Saunders Ltd.
5.) Zeeman, FJ. (1998) Applications of clinical nutrition. Englewood cliffs: Prentice Hall International Inc.
6.) Thomas B (1995) Blackwell Manual of Dietetic practise, 2nd Ed., Oxford: New York, 1995.
7.) Robinson (2006) Normal and therapeutic nutrition, Macmillan Pub. Company New York.
8.) Mudambi SR, Rajagopal MV (2015) Fundamental of food, nutrition and diet therapy. New age International Publ., New Delhi.
9.) Srilakshmi B (2014) Dietetics, New age international Publ., New Delhi.
10.) Williams, S.R. Nutrition and Diet therapy, Times Mirror/Mosby College Publishing, St. Louis, seventh edition, 2000.
11.) Raheena, Begum, A textbook of Foods, Nutrition and Dietetics, Sterling Publishers, New Delhi, 1989.

COURSE NAME: FOOD PRESERVATION - PRACTICAL 2 HOURS/WEEK
COURSE CODE: FND33204
CONTACT: 2P
CREDITS: 1

1.) Pickling of fruits and vegetables.
2.) Preparation of frozen foods and vegetables.
3.) Preparation of sauces and ketchups.
4.) Preparation of jams and jellies.
5.) Preparation of chutneys.
6.) Preparation squash, ready to serve beverages.
7.) Preparation of preserved and candied fruits.
8.) Estimation of acidity of fruit juice.
9.) Sensory analysis of preserved and processed foods.
10.) Visit to food industry.

REFERENCE BOOKS:

1.) Frazier WC, Westoff DC (1998) Food Microbiology 4th Ed., Tata Mc Graw Hill Publ. Co. Ltd.
2.) Prescott SC, Proctor BE (1937) Food Technology, McGraw Hill.
3.) Desroier NV (1963) The technology of food preservation, AVI Pub. Co.
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5.) Manay NS, Shadaksharaswamy M (2010) Foods - Facts and principles, New Age International Publ., New Delhi.
6.) Potter NN, Hotchkiss JH (1966) Food Science, 5th Ed., CBS Publisher and Distributors, Delhi.
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9.) Desrosier, N.W. and Desrosier, J.N. (1987). The Technology of Food Preservation. CBS Publishers and Distributors, New Delhi.

COURSE NAME: PROJECT WORK (INTERNSHIP)
COURSE CODE: FND33206
CONTACT: 0
CREDITS: 6

COURSE OBJECTIVES: This will enable the students to:

1.) Evaluate the nutritional status and dietary pattern of patients.
2.) Execute the planning and preparation of therapeutic diets.
3.) Develop skills in feeding patients and supervise food service.
4.) Gain skills in diet counselling.
5.) Pursue dietetics as a profession.
6.) Execute project work related to food or nutrition or diet or hygiene or sanitation related areas.
7.) Get industrial exposure and experience by working in the industrial sector.
8.) Work in the industrial sector to venture into entrepreneurship.
9.) Food Safety and Standards Authority of India (FSSAI)-based modules to be used for training in villages/schools/self-help groups, etc.

A candidate shall undergo dietetics internship in a hospital or do project work on food related areas or do an internship in the food industry (industrial training) and submit the report.

SCHOOL OF MEDICAL SCIENCES