SunRise University
Approved by Govt. of Rajasthan vide Sunrise University Act, 2011
Recognized by UGC Act, 1956 u/s 2 (f)

FACULTY OF ALLIED HEALTH SCIENCES

REGULATIONS & SYLLABUS

M. Sc. (Human Nutrition)

SunRise University

Alwar, Rajasthan

FIRST SEMESTER

PAPERS CODE	PAPERS NAME	INTERNAL	EXTERNAL	TOTAL
MSHN101	Nutritional Biochemistry	40	60	100
MSHN102	HumanPhysiology	40	60	100
MSHN103	Biostatistics &Research methodology	40	60	100
MSHN104	Cell Biology	40	60	100
MSHN105	Regulatory affairs in clinical Research	40	60	100
PRACTICAL				
MSHN106	Analytical Biochemistry - Practical	60	40	100
MSHN107	Separation Techniques –Practical	60	40	100
Total		**320**	**380**	**700**

SECOND SEMESTER

PAPERS CODE	PAPERS NAME	INTERNAL	EXTERNAL	TOTAL
MSHN201	Human Nutrition I	40	60	100
MSHN202	Human Nutrition II	40	60	100
MSHN203	Medical and FoodMicrobiology	40	60	100
MSHN204	Nutrigenomics & Nutraceuticals	40	60	100
MSHN205	lecular Diagnostics & Therapeutics	40	60	100
PRACTICAL				
MSHN206	Food Analysis -Practical	60	40	100
MSHN207	Microbiological Analysis - Practical	60	40	100
Total		**320**	**380**	**700**

THIRD SEMESTER

PAPERS CODE	PAPERS NAME	INTERNAL	EXTERNAL	TOTAL
MSHN301	Human Nutrition III	40	60	100
MSHN302	Assessment of Nutritional Status	40	60	100
MSHN303	Food Biotechnology	40	60	100
MSHN304	Bio safety & Bioethics	40	60	100
PRACTICAL				
MSHN305	Advanced Analytical Biochemistry - Practical	60	40	100
MSHN306	Diet Planning -Practical	60	40	100
Total		**280**	**320**	**600**

FOURTH SEMESTER

PAPERS CODE	PAPERS NAME	INTERNAL	EXTERNAL	TOTAL
MSHN401	Human Nutrition IV	40	60	100
MSHN402	Bio safety & Bioethics	40	60	100
MSHN403	Major Project (Research Dissertation)			200
MSHN404	Research Dissertation Presentation			200
Total		**80**	**120**	**600**

M.Sc., HUMAN NUTRITION

SYLLABUS

NUTRITIONAL BIOCHEMISTRY- Core

Unit 1- Proteins and amino acids:

-I- Definition, sources of protein, biologically complete Protein, classification, distribution and functional diversity of proteins,

Proteins- Structure and organization, unfolded and misfolded protein, physio-chemical properties, techniques of protein purification. Methods to Estimate Protein. Methods for evaluating protein quality.

-I- Amino acids- Classification and structure, properties,. Formation of peptide linkages, amide plane and biologic activity. Amino acids reactions and identification techniques

Unit-2 -Enzymes:

-I- Classification, nomenclature, general properties- stereo and reaction specificity, Coenzymes and cofactors, their structure and functions.

-I- Kinetics and mechanisms of enzyme action, regulation of enzyme activity Enzyme inhibition.

-I- Isoenzymes, immobilized enzymes, estimation of enzyme activity, clinical significance of enzymes and enzyme assays.

Unit-3 carbohydrates and lipids

Carbohydrates: Definition, Classification(Monosaccharide, disaccharides, polysaccharides.), good and bad carbohydrates, sugar derivatives of biomedical importance, stereoisomerism and optical activity, chemical properties. Inter conversion of hexoses, hetero-glycans. Methods to estimate sugars and starch.

-I- **Lipids:** Definition,Food sources, Classification, chemical structure, and properties and functions of fatty acids, Triglycerides, phospholipids and derivatives, cholesterol and derivatives. Distribution. biological functions of lipids.

-I- Glycolipids, Lipoproteins: Types, Structure and its functions, Methods to determine crude

fat and fatty acids. Methods to determine crude fat , fatty acids & cholesterol.

Unit-4-Nucleic acids:

i- Definition, Components, major and minor bases, food sources of Purine, types of nucleic acids.

-I- Structure and level of organizationof DNA, Physico chemical properties of DNA, biological importance of DNA , types of RNA its structure and function, DNA replication and enzymes in DNA replication. Overview of transcription and translation.

Unit-5: Bioenergetics and oxidative metabolism

X- Energy producing and utilizing systems,

-I- Thermo dynamic relationships and energy-rich components.

-I- Sources of and fates of acetyl CoA , Electron transport chain, oxidative phosphorylation

Reference/ Text books

1. Text book of Biochemistry by Debajyothi Das, Academic Press, (1978)
2. Stryer's text book of Biochemistry, WH Freeman, 5th Edition, (2002)
3. Harper's Illustrated Biochemistry, 29th Edition, The McGraw- Hill Company, (2012)
4. Principles of Nutrition, Eva D. Wilson, Catherine H Fisher Wiley Eastern Pvt Ltd., (1971)
5. Principles of nutrition, Wilson Fisher Wiley Eastern Pvt Ltd., (2006)

HUMAN PHYSIOLOGY - CORE

Unit-I

1. General Physiology:
    -I- Concept of Homeostasis
2. Body and body fluids:
    -I- Body fluid volumes, compartments and composition
    -I- Blood composition and functions
    -I- Plasma proteins - Types and functions
    -I- Erythrocytes - functions, Erythropoiesis , anemias
    -I- Leucocytes - classification and functions
    -I- Platelets - morphology and functions
    -I- Blood coagulation - Mechanism and name of anticoagulants
    -I- Blood groups - Basis of ABO & Rh grouping, Erythroblastosis Foetalis
3. Muscle physiology:
    -I- Muscles - Classification & structure of striated, nonstriated & cardiac muscle
    -I- Neuromuscular junction
    -I- Mechanism of skeletal muscle contraction
4. Digestive system:
    -I- Salivary glands, functions of saliva
    -I- Parts of stomach, composition & functions of gastric juice
    -I- Pancreatic juice - composition & functions
    -I- Bile - composition & functions of bile & bile salts
    -I- Functions of Small intestine & large intestine

Unit -II

1. Skin:
    -I- Structure & Functions
2. Excretory system:
    -I- Kidney: Basic physiological anatomy(Including JGA)
    -I- Formation of urine - GFR
    -I- Formation of urine - Reabsorption & secretion

-I- Micturition Reflex -I- Dialysis- Principle, types -I- Renal function tests

Unit -III

1. **Endocrine system:**

-I- Hypothalamo hypophyseal inter relationship

-I- Posterior pituitary hormones and its actions

-I- Anterior pituitary hormones, Growth hormone - Actions

- Dwarfism, gigantism, acromegaly -I-

Thyroid hormones - Actions

- Cretinism, Myxoedema, Grave's disease (clinical features)

-I- Parathyroid hormones - Functions, Tetany -I- Insulin ,Glucagons - Actions , Diabetes mellitus -I- Adrenal medullary hormones & their actions -I- Adrenal cortex hormones & their actions

2. **Reproductive system:**

-I- Male reproductive organs - Spermatogenesis, Testosterone actions -I- Female reproductive organs - menstrual cycle (endometrial and ovarian cycles) and its hormonal control -I- Contraceptive methods in male and female

Unit -IV

1. **Respiratory system:**

-I- Basic physiological anatomy -I- Surfactant

-I- Mechanics of respiration

-I- Lung volumes and capacities

-I- Oxygen transport, Carbon-di-oxide transport

-I- Nervous and chemical regulation

-I- Pulmonary function tests.

2. Cardiovascular system:

-I- Basic physiological anatomy, innervations of heart -I- ECG- normal waves, intervals and their significance -I- Cardiac cycle - mechanical events, Heart sounds -I- Blood pressure - Definition, measurement, normal values, factors maintaining BP& Regulation

Unit -V

1. Nervous system:

-I- Structure of neuron, neuroglial cells, synapse and transmission across it

-I- Reflex - Components of reflex arc, examples.

-I- Functions of ascending tracts - Anterior, lateral spinothalamic tracts, Dorsal column

-I- Functions of Corticospinal(Pyramidal) tract- Descending tract

-I- Functional areas of cerebral cortex

-I- Functions of basal ganglia, thalamus, hypothalamus, limbic system and cerebellum

2. Special senses:

-I- Receptors for various special senses

Reference// Text books

1. Human Physiology for BDS by A.K.Jain, 4th Edition, Avichal publishing Co.(2014)
2. Textbook of Human Physiology, Hermann Rein, 14th edition edited by Dr. Max Schneider.(Pp. 765 -t-xii; illustrated. DM. 59.60.) Berlin, Gottingen, Heidelberg: Springer-Verlag. 1960.
3. Textbook of Physiology and Biochemistry, George H.Bell, et al. Fifth edition. Edinburgh and London: Livingstone Ltd. 1961

PG Sem -1	Biostatistics and Research Methodology (Credits -5)					
Requisite	**To have basic knowledge in basic Mathematics, basic Statistics and basic Research Analytical skills**					
Objective	**To impart knowledge on basic principles and methods of biostatistics, providing a vast knowledge of methodological basis for health outcomes in research.**					
Modules	**Contents**					**Hr**
Unit-I	**Biostatistics - Definition and Terms:** Introduction, sample, variables, frequency distribution. Representation of data: Tabulation, bar diagram, histograms, pie-diagram, and cumulative frequency curves. Measure of central tendency: Arithmetic, mean, geometric mean, harmonic mean, median, mode and percentiles. Measures of dispersion: Range, quartiles, mean deviation, variance, standard deviation, coefficient of variation					**l6**
Unit-ll	**Association of the variables:** Introduction, correlation, correlation coefficient, properties, significance of correlation, interpretation of r, scatter plot. Regression: Linear regression, regression equation, fitting of simple regression equation and coefficient of determination, nonlinear regression and multiple regressions					**l6**
Unit-Ill	**Probability and distribution:** Probability: Introduction, sample space, independent and dependent events, equally likely events, probability measurement, addition and multiplication rules, conditional probability, Bayes theorem. Probability distribution: Binomial, poisson and normal distribution, skewness and kurtosis					**l6**
Unit-IV	**Test of Significance and estimation:** Significant testing: Introduction, null and alternative hypothesis. Statistical inference: Critical region, confidence limits, odds ratio, confidence interval, degree of freedom, p-value of the statistics, Error probabilities: Type 1 and type II. Significance analysis: Paired and unpaired t-test, analysis of variance, chi-square test					**l6**
Unit-V	**Research Design:** Survival analysis: Concepts of survival analysis; Estimations of survival rate: The life table method and the product limit method, log-rank test for survival curves. Sampling: Introduction, Sample variation and Bias, sampling distribution, estimation of sample size. Sampling methods: Simple random sampling stratified random sampling, systematic random sampling, and cluster random sampling its advantages. Experimental design: Rules of experimental design, types of questionnaires, concept of blind method, randomized control trial method					**l6**

Text Book:

i. Basic Statistics- A primer for Biomedical Sciences - (Olive Jean Dunn) 4th edition, wiley publishers, 2009. i. Fundamentals of Biostatistics-Bernard Rosner, Cengage Learning, Inc publishers; 7th edition, 2010.

Reference Books:

1. Biostatistics: A Foundation for Analysis in the Health Sciences, Wayne W. Daniel and Chad L. Cross, 10th edition (2013), Wiley series in Probability and Statistics, USA
2. Statistics. Prem S. Mann, 5th edition (2004), John Wiley and Sons (Asia) Pvt. Ltd.
3. P. S. S. Sundar Rao, J. Richard; Introduction to Biostatistics and Research Methods, 4th edition (2006), PHI Learning Pvt. Ltd., India
4. Gerald Van Belle, Lloyd Fisher; Biostatistics: a methodology for the health sciences, 2nd edition (2004), John Wiley and Sons, USA

Specific learning Outcome (SLO):

> Understand the basic descriptive and inferential statistics including the concepts, principles of research design and statistical inference.

> Communicate with the statisticians and other professionals about the planning, implementation and interpretation of the analytic studies

> Provides understanding on how research is carried out

Cell Biology - Core

Unit - 1: Evolution of the Cell:

44-4- Cell as a unit of living organism, Diversity of cell size and shapes, Structure of Prokaryotic and Eukaryotic cells, Single cell to multicellular organism Cell - Cell interactions; Cell adhesions, and cell junction

Unit - 2 : Biomembrane and Cytoskeleton :

44-4- Molecular organization of Biomembrane: Ultrastructure Fluid -Mosaic model and molecular .0

Composition of membrane, Physical and Dynamic properties of membrane, Movement of molecules/ions across biomembrane

Unit - 3 : Cell Organelles I:

4- Molecular organization of Mitochondria, Cytoplasm, Peroxisomes, Ribosomes,

Unit - 4: Cell Organelles II:

-I- Nucleus - Organization, compositions and functions of : Endoplasmic reticulum, Golgi complex, Lysosomes, Cytoskeleton

Unit -5 : Cell and diseases

-I- MELAS, Zwellweger's syndrome, I cell disease, role of lysosome in gouty arthritis and silicosis. Apoptosis

Reference/ Text books

1. Essential Cell Biology - Bruce Alberts, Dennis Brav, Karen Hopkin. ISBN: 97808153-4130-7, Edition - 2010; Publisher: Grandland Science.
2. Molecular Cell Biology H. Lodish, D. Bathinore, A. Berk, S.L Zipursky, P. Matsudara& J. Darnell Scientific American Books, USA 1995

Analytical Biochemistry /Practical LAB - 1

-I- Normality , Molality , Molarity , Percentage of Solution, Dilution- Exercises

-I- pH of the solution by strip, by pH meter, pH of the Solids -I- Identification of Carbohydrates in the Given Solution or substance Glucose 2. Fructose 3. Maltose 4. Lactose 5. Sucrose.6. Polysaccharides Hydrolysis of starch

-I- Identification of Lipids in the reaction -I- Identification of Proteins (Qualitative test)

-I- Identification of Amino acids in the solution

Reference/ Text books

1. Analytical Biochemistry and Separation techniques, P. Palanivelu, 4th Edition, Twentyfirst century publications, Palkalai Nagar, Madurai, India, 2009
2. Principles and Techniques of Practical Biochemistry. Keith Wilson and John Walker, 5th Edition, Cambridge University Press, (2000)
3. Analytical Biochemistry. D. Holme& H. Peck. 3rd Edition. Longman Group Ltd, London (1983)
4. Protein Purification - Principles & Practices. R. Scopes. 3rd Edition, Springer Verlag, New York, (1994)

Separation Techniques -Practical Lab - 2

-I- Principles of Colorimetry, complementary color system, Optical density -I- Standardization and Estimation of Proteins by Different Methods -I- Separation of Protein by Agarose Gel Electrophoresis and PAGE -I- Identification of Molecular weight of a Protein -I- Protein separation by Dialysis and Precipitation **Reference/ Text books**

1. Analytical Biochemistry and Separation techniques, P. Palanivelu, 4th Edition, Twentyfirst century publications, Palkalai Nagar, Madurai, India 2009
2. Principles and Techniques of Practical Biochemistry. Keith Wilson and John Walker, 5th Edition, Cambridge University Press, (2000)
3. Analytical Biochemistry. D. Holme& H. Peck. 3rd Edition, Longman Group Ltd, London (1983)
4. Protein Purification - Principles & Practices. R. Scopes. 3rd Edition, Springer Verlag, New York, (1994)

SECOND SEMESTER

Human Nutrition - I Core

Unit -1: Basics of Nutrition:

Basis for computing nutrient requirements:

-I- Latest concepts in dietary recommendations, RDA- ICMR and WHO: their uses and limitations.

Components of Food

Unit -2: Carbohydrates

X- Carbohydrates: Occurrence and physiological functions, factors influencing metabolism.Utilization of carbohydrate in different pathways(overview of Glycolysis, gluconeogenesis, glycogen synthesis) . Mode of utilization of Carb in different tissues viz brain,adipose tissue, muscle oand Liver. Fructose and Galactose utilization. Maintenance of Glucose levels in Circulation throughout the day. Lactose intolerance. Dental caries. Artificial sweeteners. Role of dietary fiber in health and disease.Disorders related to carbohydrate metabolism.Glycemic index of foods and its uses.calorie counting

Unit- 3; Lipids

-I- Lipids: Concepts of visible and invisible fats. EFA, SFA, MUFA, PUFA (omega 3 & 6)- sources and physiological functions. Role of lipoproteins, cholesterol and triglycerides as nutrients. Overview of Utilization and Storage pathways for Fatty acids(over view of Synthesis and Beta oxidation of Fatty acids and Ketone body metabolism) sources for triacyglycerol and cholesterol. Regulation of Cholesterol in circulation.

-I- Myths about Lipids

Unit — 4 ; Proteins

i- Proteins: Concepts of essential and non-essential amino acids- their role in growth and development. Physiological functions of proteins. Requirements, nitrogen balance concept. Protein catabolism and ammonia synthesis, urea cycle. Substances synthesized from Amino acids and their role in the body . Protein energy malnutrition-clinical features and biochemical changes.

Unit -5; Intermediary Metabolism

i- Adaptations during starvation and calorie excess

Reference/ Text books

1. Principles of Nutrition, Eva D. Wilson, Catherine H Fisher Wiley Eastern Pvt Ltd., 1971
2. Principles of nutrition, Wilson Fisher Wiley Eastern Pvt Ltd., 1971
3. Normal Nutrition, Robinson, CH, McMillan Publishers (1968).

/Human Nutrition II - Core

Unit -1: Nutrients (Minerals)

Note: All the nutrients will be dealt with Digestion, absorption and transport and excretion, functions, interaction with other nutrients (if any), RDA, Deficiency and toxicity, major sources, Assessment of nutriture and analysis in food material.

-I- Macro minerals: Calcium, Phosphorus Magnesium, Sodium, Potassium chloride.

-I- Micro minerals: Iron, Zinc, copper, selenium, chromium, iodine, manganese, Molybdenum and fluoride.

-I- Ultra trace minerals: Arsenic, Boron, Nickel, Silicon, Vanadium & cobalt:

Unit- 2: Vitamins

Note: All the nutrients will be dealt with Digestion, absorption and transport and excretion, functions, interaction with other nutrients (if any), RDA, Deficiency and toxicity, major sources, Assessment of nutriture and analysis in food material.

-I- Fat soluble Vitamins: Vitamin A, Vitamin D, E & K.

-I- Water soluble vitamins: Vitamin C, Thiamine, Riboflavin, Niacin, Pantothenic acid, Biotin, Folic acid, Vitamin B12, VitaminB6.

Unit - 3 : Regulation of Energy metabolism

Energy metabolism: Basal and resting metabolism- influencing factors.regulating factors -I- Methods to determine energy requirements & expenditure.

-I- Thermo genesis, adaptation to altered energy intake,

-I- Latest concepts in energy requirements and recommendations for different age groups.

Unit-4; ***Fluid, electrolytes & Acid- Base Balance***

Body fluids and water balance: Body water compartments. Regulation of water balance, regulation of electrolytes, sources supply water and electrolytes to body -I-Definition , defence mechanism in maintaining Physiological pH. Acid and alkali producing foods ***Unit-5; Food Planning***

4- Basic principles of planning diet - BMR, RDA for Indians, Food groups, Dietary guides and balanced diets.

4- Factors affecting food habits, choices and dietary patterns - Definition of Food, desirable diet for optimum nutrition, health and fitness. Food pyramids, plate theory

Reference/ Text books

1. Principles of Nutrition, Eva D. Wilson, Catherine H Fisher, Wiley Eastern Pvt Ltd., 1971
2. Principles of Nutrition, Wilson Fisher, Wiley Eastern Pvt Ltd., (1971)
3. Text Book of Human Nutrition, Mahtab S. Bamji Oxford & IBH Pub. Co. (1996)

PCMFM70/Medical and Food Microbiology - Core

Unit 1 - Food Microbiology - Basic Concept

1. Role of Microorganisms in Fermented Food
2. Fermented Baked Preparations and Vegetable Foods - Rye bread, dough bread, pickles, olives, sauerkraut and leafy vegetables.
3. Fermented Dairy Products - butter milk, yogurt, cheese, kefyr, kumiss and sour cream
4. Economically Important Fermentation Products - malt beverages, wines, distilled liquors and vinegar.

Unit 2 - Occurrence and Growth of Microorganisms in Foods

1. Morphological and cultural characteristics of Bacteria, yeasts, yeast - like fungi and molds which are important in food microbiology.
2. Factors affecting the growth of Microorganisms - Nutrition , Oxygen, Temperature ,Moisture Requirement, Hydrogen Iron Concentration -pH , Light
3. Destruction of Microorganisms - Sterilization, physical, chemical methods disinfection, filteration and radiation .
4. Micro biology of air, water and milk.

Unit 3 - Food Spoilage

1. Factors Responsible for Food Spoilage
2. Chemical Changes due to Spoilage
3. Spoilage of Different Foods
   - Spoilage of Meat
   - Spoilage of Poultry and Poultry Products
   - Spoilage of Fish and Other Sea Foods
4. Spoilage of Different Foods
   - Spoilage of Fruit and Vegetables
   - Spoilage of Cereals and Cereal Products
   - Spoilage of Milk and Milk Products
   - Spoilage of Soft Drinks, Fruit Juices, and Fruit Preserves
   - Miscellaneous Products - Essential oils, spices, salt and fatty foods

Unit 4 - Food Borne Diseases

1. Bacterial

- Staphylococcal Poisoning
- Bacillus Cereus Poisoning
- Botulism
- Clostridium perfringens gastroenteritis
- Salmonellosis
- Shigellosis (Bacillary Dysentery)
- Cholera
- Vibrio Parahaemolyticus, Gastroenteritis
- Diarrheagenic Escherichia coli
- Yersinia enterocolitica gastroenteritis
- Campylobacter jejunidiarrhoea

2. Viral

   - Hepatitis A
   - Rotavirus and Norwalk virus

3. Mycotic
   - Aflatoxicosis
   - Mycetism
   - Ergotoxicosis

4. Parasitic diseases
   - Protozoa - E.histolytica and Giardia
   - Toxoplasma gondii, Cryptosporidium, Isospora, Cyclospora and Sarcocystis
   - Cestodes - Taeniasolium, T.saginata, D.latum
   - Nematodes - Trichinella spiralis, Trichuris,Ascaris

Unit 5- Food Contamination & Food Adulteration

1. Food Safety and Importance of Safe Food

   a. Recent Concerns of Food Safety - Genetically Modified Foods, Dioxin - Contaminated Foods.

   b. Food Hygiene - general principles, hygiene in urban and rural areas in relation to food preparation, personal hygiene and food handling habits.

2. Sources of Food Contamination

a. Toxicants in Animal Foods
b. Toxicants in Plant Foods
c. Anti-Nutritional Factors in Foods
d. Biological Contaminants
e. Pesticide Residues
f. Veterinary Drug Residues

g. Heavy Metals
h. Miscellaneous Contaminants

3. Food Adulteration

    a. Classification and Harmful effects of Adulterants
    b. Methods for Detection of some Adulterants

4. a. Food Standards and Regulations in India b.Prevention of Food Adulteration Act.

Reference/ Text books

1. Food Microbiology, M. R. Adams & M. O. Moss The Royal Society of Chemistry, Cambridge 2000
2. Fermented Food Biotechnology, H. A. Modi Aavishkar Publisher, Jaipur 2011
3. Introductory Food Microbiology, H. A. Modi Aavishkar Pub., Jaipur 2007
4. Developments in Food Microbiology, R. Davis Appl. Sci. Publ, London 2004

PENN071/ Nutrigenomics and Nutraceuticals

Unit-i: Nutrigenomics

Definition of nutrigenomics, evolution and its uses in preventing or treating diseases.

Unit-2: Mechanism of action of nutrients on gene

Nutrients as signal, signal transduction, transcriptome, metabolome.

Unit-3: Tools needed for nutrigenomics research

- To measure transcriptome;- Microarray, exonarray, tilling arrays, SNP arrays and genotyping
- To measure Proteome;- Gel electrophoresis, Chromatography, mass spectrophotometry
- To measure metabolome;- Nuclear magnetic resonance imaging and mass spectrometry with Gas or liquid chromatography

Unit-4: Nutracueticals

- Definition. Use of neutraceuticals in traditional health sciences such as Sid ha, Ayurveda, Unani and Chinese. Their role in preventing/controlling diseases.

Unit-5: Phytochemicals

Natural occurrence of certain phytochemicals in foods, Antioxidants and flavonoids, omega- 3 fatty acids, carotenoids, entindietary fiber, phytoestrogens; glucosinates; organosulphur compounds. Scientific, clinical evidence, in vivo, in vitro research studies. Regulatory issues.

PEMDT72/ Molecular Diagnostics & Therapeutics

Unit I: Interaction between Host pathogen diseases

Host pathogen interactions in disease process; Protective immune response in Bacterial, Viral and Parasitic diseases; Clinical diagnosis of diseases; Molecular Genetics of the host and the pathogen.

Unit II : Molecular Diagnosis of diseases

Biochemical disorders; Immune, Genetic and Neurological disorders; Molecular techniques for analysis of these disorders; Assays for the Diagnosis of inherited diseases; Present methods for diagnosis of Specific diseases like Tuberculosis, Malaria and AIDS; Ethics in Molecular Diagnosis.

Unit III: Application of Recombinant DNA in medical field

Recombinant therapy; Clinical applications of recombinant technology; Erythropoietin; Insulin analogs and its role in diabetes; Recombinant human growth hormone; Streptokinase and urokinase in thrombosis; Recombinant coagulation factors.

Unit IV: Manipulation for treating a disease

Gene therapy; Intracellular barriers to gene delivery; Overview of inherited and acquired diseases for gene therapy; Retro and adenovirus mediated gene transfer; Liposome and nanoparticles mediated gene delivery;

Gene silencing technology; Antisense therapy; siRNA; Tissue an organ transplantation Transgenics and their uses; Cloning; Ethical issues.

Unit V: Bioinformatics tools in diagnosis

Isolation of proteins and other molecules associated with disease; Process and their profiling for diagnosis; 2D analysis of such proteins by sequencing individual spots by Mass Spectrometry; Protein Micro array; Bioinformatics tools for molecular diagnosis

Reference Books:

1. Campbell, M.A and Heyer L.J., Discovering Genomics, Protemics and
2. Bioinformataics, 2nd Edition, CSHL Press, Pearson/ Benzamin Cummings San Francisco, USA, 2007
3. Andrew Read and Dian Donnai, New Clinical Genetics, Scion Publishing Ltd 4. Oxfordshire, UK, 2007.
5. James W Goding, Monoclonal antibodies: Principles and Practice, 3rd Edition

6. Academic Press, 1996.

7- George Patrinos and Wilhelm Ansorage, Molecular Diagnostics, ist Edition, Academic Press, 2005.

8. Lela Buchingham and Maribeth L. Flawsm, Molecular Diagnostics; Fundamentals,

9. Methods and Clinical Applications, ist Edition, F A Davis Company, Philadelphia, USA, 2007.

10. Bernhard Palsson and Sangeeta N Bhatia, Tissue Engineering, 2nd Edition, Prentice Hall, 2004.

11. Pamela Greenwell, Michelle Mc Culley, Molecular Therapeutics; 21st century medicine, ist Edition, Sringer, 2007.

PLFA073/ Food Analysis

-I- Determination of moisture, Ash - total, acid soluble and insoluble.

-I- Determination of Protein in foods.

-I- Determination of Fat - Crude fat.

-I- Carbohydrates - Free sugars, Starch (Total & available), Dietary fiber.

-I- Mineral estimation - Dry and wet ashing, calcium, iron, phosphorous.

-I- Vitamin estimation - Ascorbic acid, thiamine, riboflavin and P carotene.

Reference/ Text books

1. Food Science and Processing Technology. Vol-II MridulaMirajkar, Sreelata Menon Kanisaka Publishers 2002
2. Fermented Food Biotechnology, H. A. Modi Aavishkar Publisher, Jaipur 2011
3. Food Additives H. A. Modi Aavishkar Publisher, Jaipur 2011
4. Food chemistry, A Laboratory Manual Inter science publication John Wiley & Sons Inc 2009

PLMAo74/Microbiological analyses

-I- Food Analysis

-I- Drinking Water Analysis

-I- Milk Analysis

-I- Identification of bacteria by culture and biochemical tests

Reference/ Text books

1. Manual of methods of analysis of foods: Microbiological testing
   Food safety and standards authority of India, Ministry of Health and family welfare Government of India, 2012

THIRD SEMESTER

PCCMN75 / Human Nutrition III - Community Health and Nutrition —Core

Unit-1: Introduction to Public Health nutrition

-I- Relationship between health and nutrition, Role of public health nutritionists in the health care delivery.

-I- Determinants of health status, vital statistics-mortality, morbidity rate and life expectancy.

-I- Assessment of nutritional status of individuals and population, anthropometry, biomarkers (biochemical and biophysical), clinical measures, dietary assessment and immunization.

Unit-2: Nutritional problems in the community

-I- Common nutritional problems in the community: etiology, prevalence, clinical manifestation and assessment of macronutrient malnutrition (PEM)

-I- Micronutrient malnutrition-vitamin-A, iron, iodine, and zinc its prevention measures.

-I- Nutrition and infection.

Unit-3: Maternal nutrition

-I- Physiological aspect and nutritional requirements in pregnancy and lactation .

-I- Effect of malnutrition on pregnancy out come. Factors affecting lactation, Effect of lactation on maternal malnutrition and fertility.

Unit - 4; Infant Nutrition

-I- Breast feeding and its implication, hazards of bottle feeding Human milk v/s milk substitutes.

-I- Weaning practices formulation and preparation, commercial supplements v/s homemade preparation.

-I- Growth and development of an infant, nutritional requirement and nutritional problems specific to this age group.

Unit -5: Role of national and international organizations:

-I- National organization - ICMR, ICAR, CSWB, SSWB, NIN, CSIR. Fortification and enrichment of food. Other nutrition intervention programmes for control of 1. Energy Malnutrition 2. Vitamin A Deficiency 3. Anemia Prophylaxis 4. Goiter control 5. Flurosis 6. Epidemic Dropsy 7. Lathyrism

4- International organization- FAO,WHO,UNICEF,AFPRO,WORLD BANK CARE Their role in combating malnutrition, Food and nutrition security

Reference/ Text books

1. Nutrition in the Community-The Art of Delivering Services Owen, A.Y &Fracle, R.T (1986)
2. Nutrition Problems Of India Shukla. P.K Printiace Hall, India (Latest Edition)
3. Nutrition problems of India Shukla. P.K Prentiace Hall, India 1982
4. Nutrition, principles and application in health promotion, Carol West Suitor, Lippincott company Ltd. 1984
5. Pediatric nutrition in clinical practices William. O Wiley publishing Co 1981
6. Maternal and Child Nutrition, Ritchey, S.J and J. Taper Harpers and Publishers (Latest edition)

PCCND76/ Human Nutrition IV- Clinical Nutrition and Dietetics - Core

Unit -1; Introduction of clinical nutrition and dietetics

-I- Definition and history of dietetics. Concepts of a desirable diet for optimum health. Interrelationship between food, nutrition and health. Factors affecting food choices, Regulation of food intake-hunger, satiety, role of neurotransmitters.

-I- Role of dietician in hospital- specific functions, team approach in patient care, psychological consideration, interpersonal relationship with patients. Nutrition and medical ethics. Hospital dietary- scope and importance, types of food serviceet, quality management.

Unit -2 ; Planning Diet

-I- Principles of planning a normal diet: characteristics of a normal diet, meeting nutrient requirements of individuals and family. Use of Dietary guidelines for Indians.

-I- Objectives of diet therapy- Regular diet and rationale for modifications in energy and -I- other nutrients, texture, fluid, soft diets etc.

Unit -3 ; Enteral and parenteral feeding

Principles, types, methods of administration, monitoring and complications.

Unit 4 ; Dietary principles and management of special conditions

-I- Surgical conditions, burns and organ transplants -I- Protein and energy malnutrition (hospital and domiciliary treatment)

-I- Nutrient deficiencies - Vitamin A, iodine, osteoporosis.

-I- Children with special needs- spastic, polio affected

-I- Food allergy- causes, methods of detection and preventive measures

-I- Febrile diseases- tuberculosis, typhoid, pneumonia, measles, malaria and chicken pox.

-I- Nutrition counseling: definition, concept, role of clinical dietician, the recipient and counseling environment and goals of counseling. An overview of systems approach to nutritional care and its components (planning, implementation and evaluation).

Unit -5 ; Drug and nutrient interaction

X- drug - drug / drug-nutrient interaction - effect on ingestion, digestion, absorption and metabolism of nutrients, effect on nutritional status, effect on organ function, drug dosage and efficacy, drug abuse and drug resistance.

Reference/ Text books

1. Human nutrition and dietetics, Garrow, Ed SANAL, James Churchill Livingston, Publication U.K 1993.
2. Nutrition, principles and application in health promotion, Carol West Suitor, Lippincott company Ltd. 1984

5. Pediatric nutrition in clinical practices, William, O., Wiley publishing Co. 1981

PCANS77/ Assessment of Nutritional

Status ***Unit-1; Indirect Methods***

Demography, population dynamics and vital events and their health implications, indicators of health and nutrition (IMR, TMR, MMR)

Unit -2 ; Direct methods -

-I- Anthropometry, Biochemical, Clinical, Dietary and Functional indices of assessments.

-I- **Anthropometry -** methods, reference standards in children and adults, scales of comparison (percentiles, Z score), classification and interpretation of somatic data, somatic indicators of PEM ***Unit -3 ; Biochemical***

4- Use of specimen types, indicators of protein-energy status, anemia, immune function, CVD risk, oxidative stress. Urine and stool analyses.

Unit - 4 ; Dietary

44- **Dietary** -Methods, nutrient intake analysis, dietary assessment in special populations and specific situations, Dietary reference intakes

Unit - **Clinical- c**omponents of clinical assessment, associations with nutrient deficiencies and

4- biochemical status

5 ; Assessing food and nutrition security

Definition and assessment schedules, National and household food security. food Adulterans Factors affecting food security system. National and International systems to improve food security.

PG	PEIBB78 /IPR, Biosafety £r Bioethics (Elective - 2)	L	P	T	J
Sem III	(Credits -5)	5	0	0	0

Requisite Expected to have basic knowledge in general biosafety

Objective To provide knowledge on intellectual property rights and educating on patent filing to protect their IPR

Modules	Contents	Hr
Unit-I	**Introduction to Intellectual Property:** IP as a factor in R&D; Types of IP: Patents, Trademarks, Copyrights, Industrial Design, Traditional Knowledge, Geographical Indications, Protection of New GMOs; International framework for the protection of IP; Objectives and Principles of GATT, WTO, WIPO, Budapest Treaty, PCT and TRIPS	16
	Basics of Patents £r Infringement Analysis: Types of patents - Types of patent applications- Provisional and Complete specifications, PCT and convention patent applications; Concept of Patent Search and Patent Analysis Report-Patent databases, Searching International Databases; Country- wise patent searches (USPTO, EPO, India etc.); Patentability; Patent Analysis Report Preparation; Invention in context of "prior art"- Prior Art Search; Indian Patent Act 1970- Recent Amendments; Patent infringement- meaning, Scope, litigation, case studies and examples	**16**
Unit-III	**Patent filing:** Patent application- terms and guidelines, fee structure, time frames; Filing of a patent application, Precautions before patenting-disclosure/non-disclosure; Procedure for filing a PCT application, Procedure for filing a Indian Patent Application, International patenting requirement, procedures and costs; Role of a Country Patent Office; Publication of patents-gazette of India, status in Europe and U.S; Financial assistance for patenting-introduction to existing schemes; Patenting by research students, lecturers and scientists University/organizational rules in India and abroad, credit sharing by workers, financial incentives	16
Unit-IV	**Biosafety:** Introduction: Historical Background; Introduction to Biological Safety Cabinets; Primary Containment for Biohazards, Biosafety Levels; Biosafety Levels of Specific Microorganisms; Recommended Biosafety Levels for Infectious Agents and Infected Animals; Biosafety guidelines Government of India: Definition of GMOs & LMOs; Roles of Institutional Biosafety Committee, RCGM, GEAC etc. for GMO applications in food and agriculture; Environmental release of GMOs; Risk Analysis, Risk Assessment; Risk management and communication; Overview of National Regulations and relevant International Agreements including Cartagena Protocol	16
Unit-V	**Bioethics:** Concepts, Philosophical considerations; Epistemology of Science, Ethical Terms, Principles & Theories; Relevance to Biotechnology; Ethics and the Law Issues: Genetic Engineering, Stem Cells, Cloning, Medical techniques, Transhumanism, Bioweapons; Research concerns - Animal Rights, Ethics of Human Cloning, Reproduction and Stem Cell Research; Emerging issues Biotechnology's Impact on Society; DNA on the Witness Stand - Use of genetic evidence in civil and criminal court cases; Challenges to Public Policy - To Regulate or Not to Regulate, Improving public understanding of biotechnology projects to correct misconceptions	16

Text Books:

1. Bioethics and Biosafety by M K Sateesh.ist edition, 2008, IK International Pvt. Ltd.,India
2. Intellectual Property Licensing: Forms and Analysis, by Richard Raysman, Edward A. Pisacreta and Kenneth A. Adler, 1999-2008, Law Journal Press, USA.

References:

1. Property as a common descriptor of the field probably traces to the foundation of the World Intellectual Property Organization (WIPO) by the United Nations." in Mark A. Lemley, Property, Intellectual Property, and Free Riding, Texas Law Review, 2005, Vol. 83:1031, page 1033, footnote4.

2. "Copyright and Related Rights". World Intellectual Property Organisation, http://www.wipo.int/copyright/en/. Retrieved 7 February 2010.

Specific learning Outcome (SLO):

> To provide students with a broad understanding of intellectual property right to protect them in the context of sustainable development, emphasizing all three dimensions: environmental, economic and social.

PEFB079/Food Biotechnology - Elective-1

Unit- 1; Introduction

Use of Biotechnology for food processing.

Unit -2 ; Fermentedfood

Indian fermented foods - Historical perspective, Mechanism of fermentation, effect on nutritional value.

Unit - 3 ; Beverages

4

Technology for production of alcoholic beverages ***Unit***

4

-4 ; Production of Fermented food

4

Fermented cereal and legume based products, traditional and yeast leavened products.

4

Fermentation of vegetables and fruits - lactic acid fermentation.

4

Fermented milk products - yoghurt, butter- milk, cheese.

4-

Fermentation of meat and fish.

Unit -5 ; GMfoods

i- Genetically modified foods - Need for GM foods - The food challenges, Potential benefits in agriculture, Crop engineered for input and output traits, nutritional improvement, animal foods, issues of concern - safety of GM foods.

Reference/ Text books

1. Text book of Biotechnology H. K. Das, Academic Press, - Latest edition
2. Fermented Food Biotechnology, H. A. Modi Aavishkar Publisher, Jaipur 2011
3. Nutrition in major metabolic diseases, Gopalan., Kamala Krishnaswamy, Oxford University, 2000

PLAAB80/Advanced Analytical Biochemistry -Practical Lab - 5

-I- Separation of Amino acids by circular Chromatography/ Thin Layer Chromatography -I- HPLC (demo)

-I- Subcellular Fractionation and identification

-I- Extraction of DNA from Peas, chicken liver and human saliva

Reference/ Text books

1. Analytical Biochemistry and Separation techniques, P. Palanivelu, 4th Edition, Twentyfirst century publications, Palkalai Nagar, Madurai, India
2. Principles and Techniques of Practical Biochemistry. Keith Wilson and John Walker, 5th Edition, Cambridge University Press, 2000

PLDO081/ Diet Planning - Practical Lab - 6

-I- Planning and preparation of a balanced diet for a pregnant woman -I- Planning and preparation of a balanced diet for a Lactating woman

-I- Planning, preparation and calculation of following diet

a. Normal diet
b. Liquid diet
c. Soft diet
d. High and low caloric diet
e. Diet for Diabetes mellitus

Reference/ Text books

1. Managing Food and Nutrition Services, Sari Edelstein Jones and Bartlett Pub. 2007
2. Maternal and Child Nutrition, Ritchey, S.J and J. Taper Harpers and Publishers 2012

Fourth Semester

PCPJ019/PROJECT