M.Sc. FOODS & NUTRITION
(from 2010-2011 onwards)
Scheme of Instruction

	M.Sc. FOODS & NUTRITION	**Th**	**Internal assessment (IA)**	**Pds/ wk**
Sem I				
001	Applied Physiology	50	50	6
002	Geriatric Nutrition and Assessment of Nutritional Status	50	50	6
003	FOOD SCIENCE	50	50	6
004	Advances in Food Microbiology	50	50	6
005	PRACTICAL	100		**8**
	TOTAL- 400 (THEORY) + 100 (PRACTICAL)			
Sem II				
006	Advanced Nutrition	50	50	6
007	Research Methods & Statistics	50	50	6
008	Nutritional Biochemistry	50	50	6
009	Community nutrition and nutritional deficiency	50	50	6
010	PRACTICAL	100		**8**
	TOTAL-400 (THEORY) + 100 (PRACTICAL)			
Sem III	**From 2011-12 onwards**			
011	Clinical & Therapeutic Nutrition	50	50	6
012	Institutional Food Administration	50	50	6
013	Food processing and technology	50	50	6
014	Nutrition for Health & Fitness	50	50	6
015	PRACTICAL	100		**8**
	TOTAL-400 (THEORY) + 100 (PRACTICAL)			
Sem IV				
016/017	Dissertation and seminar / Industry training(internship) and project report	500		

SEMESTER I

PAPER I APPLIED PHYSIOLOGY TH-50, IA-50

UNIT - I

1. Anatomy & Physiology defined. Structural plan, directional terms anatomical positions & sections, body cavities, abdominopelix regions.
2. Cell structure and functions - organelles, tissues and organs.

UNIT II

1. **Digestive System** - Anatomical structure and function. Secretory, Digestive and Absorptive functions. Role of liver, gall bladder and pancreas. Role of Hormones in GIT.
2. **Circulatory System-** Structure and function of heart and blood vessels. Regulation of cardiac output cardiac cycle and blood pressure,

UNIT III

1. **Respiratory System-**

   Review of structure and function. Role of lungs in the exchange of gases. Transport of oxygen & CO_2.

2. **Excretory System**

- Structure, function of nephron, Urine formation. Role of hormones in kidney functioning. Diuretics.
- Water, electrolyte and acid base balance,
- **UNIT IV**

  NERVOUS SYSTEM
- Organization of central Nervous system, structure and function of Brain & spinal cord, afferent & efferent nerves, hypothalamus and its role in various body functions

  Review of structure and function of neuron, conduction of nerve impulse, synapses and role of neurotransmitters. Blood Brain barrier. CSF.

UNIT V

1. **Endocrine System-** Anatomical Structure and function of hormones, regulation of hormone secretion, Disorders of endocrine glands.
2. **Reproductive System-** Brief overview of asexual & sexual reproduction, male & female reproductive system, Menstrual cycle, fertilization and infertility, developmental stages of Fetus.

PAPERII Geriatric Nutrition and Assessment of Nutritional Status TH-50, IA-50

Unit-I

Meaning of Ageing

The Ageing process-physiological changes and Socio-Psychological problems for elders.

Unit-II

A) Nutritional requirements for elders and dietary management to meet nutritional needs.

B) Policies & Programmes of the government & NGO sector pertaining to the elderly.

UNIT-III

Diseases and nutritional problems of elderly. Their symptoms, management, prevention & control.

Unit-IV Current methodologies of assessment of nutritional status, their interpretation & comparative application of the following:

A) Anthropometry.
B) Biochemical assessments
C) Clinical
D) Dietary Survey

Unit-V

A) Nutritional Surveillance - Basic Concepts, uses and setting up of surveillance system

B) National food and nutrition policy , plan of action and programmes

PAPER III : FOOD SCIENCE TH-50, IA-50

UNIT - I

Physical & Physiological changes in food.

a) Colloidal Chemistry as related to food emulsions, foams, sols & gels, osmotic pressure.

b)Enzymatic browning immobilized enzymes & enzymes in food Processing..

c) Denaturation of Protein.

UNIT – II) Cereal and cereal Products:

(A) Cereal grains, structure & composition , Cereal products, Breakfast Cereals.

- Leavening agents and products.

B) **Sugar and Sugar Products**

- Manufacturing Process of Sugar Stages of sugar Cookery.

C) **Starch-** Structure , gelatinization, Modified Food Starches.

D) **Fruits & Vegetables**:

-Pigments and colour in Food.

UNIT - III

A) **Milk & Milk Products**:

- Composition and properties of milk.

-Dairy Products: Cultured milk , Yoghurt, butter, Whey, cheese etc.

B) **Meat , Poultry & Egg:**

- postmortem changes in meat, tenderizing meat, heat induced changes in meat, meat substitutes.
- Egg: Structure & composition , changes during storage, functional properties of egg, egg substitutes.

UNIT-IV

Food Additives

a) Meaning, need of food additives.
b) Antioxidants, chelating agents, coloring agents, curing agents.
c) Nutrient supplements, Non nutritive sweeteners, pH control agents.
d) Preservatives, stabilizers and thickeners, Other Additives.
e) Additives & Food Safety.

UNIT-V

Sensory evaluation –Definition, meaning and various tests used in Sensory evaluation & food product development.

PRACTICALS

1. **Food Evaluation**:-Visual examination of foods & sensory evaluation.
2. **Sugar Cookery**:-
    a. Observation of different stages of sugar cookery.
    b. Crystallization of sugars through preparation of Fondant/ fudge.
3. **Egg Cookery**:-
    a. Effect of cooking time on colour, texture and acceptablity of whole egg.
    b. Effect of cooking method on coagulation property to egg.
    c. Determine stability of egg white foam.
    d. Preparation of plain fried egg. Poached egg & a scrambled egg.

4. **Fruits & Vegetables:-**
    a. Browning in fruits /Vegetables.
    b. Preparation of fruit Jelly.
    c. To determine the effect of cooking time, acid & alkali & pH on the colour flavor, texture & taste of vegetable.
5. **Cereal cookery & Leavenings agents**:-
    a. To determine the hydration capacity of different flours.
    b. Determine the factors that affect the formation & stability of mayonnaise.
    c. To determine the effect of various ingredients method on preparation of gluten balls.

PAPER IV: ADVANCES IN FOOD MICROBIOLOGY TH-50, IA-50

UNIT I

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1. Microorganism of importance in food - Their classification, morphology, growth & reproduction, industrial importance.
   Food as a substrate for microorganism - pH, moisture oxidation- reduction potential, nutrient content, inhibitory substance & biological structure

UNIT II

Methods of isolation and detection of microorganism or their products in food.

- Conventional methods
- Rapid methods (Newer techniques)
- Immunological Methods
- Chemical Methods

UNIT III

Spoilage of Food:

a) Sources of contamination- soil, water, air, animal, plant, humans, sewage, equipment and handling,.

b) contamination, Spoilage and preservation of different food groups : cereal and cereal products, milk & milk products , vegetables. & fruits, meat & meat products, egg & poultry, fish & other sea foods, canned food.

UNIT IV

Food Borne Diseases: Bacterial & Viral borne disorders, food borne important animal parasites, mycotoxins.

UNIT V

Role of microbes in fermented and genetically modified foods.
Probiotics.

PRACTICAL

1. Cleaning & sterilization of glassware.
2. Preparation of common laboratory media and special media for cultivation of bacteria, yeast & molds
3. Different methods of Isolation of micro organisms
4. Techniques & staining - monochromes & different staining negative spore staining, capsular staining & fast staining.

5. Bacteriological analysis of foods: processed & unprocessed like vegetables. & fruit, cereals, spices& canned foods.
6. Bacteriological analysis of water & milk - Total count, MPN coliform (count) & MBRT.

SEMESTER II

PAPER VI ADVANCED NUTRITION TH-50, IA-50

UNIT I

Body Composition:

(a) Concept of body composition, biochemical composition of body, Body composition as measured by the nutritionist.

Techniques of measurement.

Nutritional Anthropometry & Calculation of body density. Direct measurement using Archimedes's Principle, Calculation of percent body water & body fat from body density. Dilution technique & calculation of indices of body composition, concept of body cell mass, lean body weight & fat free body, application of body composition data.

UNIT II

a) Energy contents of foods, Physiological fuel value-review. Measurement of energy expenditure : BMR, thermic effect of feeding & physical activity, methods of measurement. Estimating energy requirements of individuals & groups.

UNIT III

a) Proteins and amino acids: structure and classification, Protein quality and methods of evaluating protein quality. Factors affecting protein bio-availability, Protein and amino acid requirements. Therapeutic application of specific amino acids: branch chain, glutamine, arginine, homo cysteine, cysteine and taurine.

UNIT IV

Non-nutritive food components with potential health effects: polyphenols, tannis, phytates, phytoestrogens, cyanogenic compounds lectins & saponins:

UNIT V

Minerals and vitamins- bioavailability, analysis and interaction with other nutrients. Minerals: calcium, sodium, chloride, iron.

Vitamins - ascorbic acid, biotin, A, D,E,K.

PRACTICAL

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1. Estimation of Protein Quality using different methods. PER, BV, NPU etc.
2. Estimation of ASH content.
3. Estimation of moisture contents in foods.
4. Estimation of crude fiber contents in foods.
5. Chromatography

PAPERVII: RESEARCH METHODS & STATISTICS TH-50, IA-50

1. **A)** Definition and identification of research problem, selection and sources of research problem, basic assumptions, limitation and delimitation of the problem. **Variables;** Type of variables, **Hypothesis**; Types of hypothesis, characteristics of hypothesis, functions of hypothesis, **Types of Movements scale-** Nominal or classificatory scale, ordinal or ranking scale, interval scale and ratio scale.

B)Types of Research- Historical, Descriptive, Experimental, Exploratory, Ex- Post- factor research, Longitudinal and cross- sectional, Case study, social, Participatory research, Explanatory research.

2. **Methods and techniques of data collection** – Group discussion, interviews, observation, questionnaire, schedule, case- study, home-visits. Attitudinal scales; Types of Attitudinal scales- likert scale, thoustone scale, Guttmann. Reliability and validity test.

3. **Research Design**- Definition, Principles, Purpose. Type of study Designs (based on number of contacts, reference, period, nature of the investigation and commonly used study designs).

Sampling- Concept, principles, factors and sample size, types of sampling- probability sampling and non- probability sampling.

Processing Data- Classification and Tabulation of Data, **Tables**- Types of Tables, **Graphs**- Histogram, line graph, bar chart, frequency polygon, pie chart. Measures control Tendency (Mean, Median, Mode).

Research report

4. **A**) Conceptual understanding of statistical measures. Classification and tabulation of data. Measurement of central of central tendency, measures of variation.

B) Binomial and Normal Distribution; Normal Probability Curve; Testing of Hypothesis: significance level , confidence limit.

C) Parametric and non parametric tests; Chi square test(goodness of fit, independence of attributes 2x2 and rxc contingency tables); t-test , f-ratio, analysis of variance- one way and two way classification.

5. a) Correlation , coefficient of correlation , rank correlation.

b) Reliability of mean , standard deviation and predictions; Experimental designs- completely randomized design , randomized block design , Latin square designs, factorial design , trend analysis.

PAPER VIII : Nutritional Biochemistry TH-50, IA-50

UNIT - I A) Electrolytic dissociation - Acids, bases, salts, buffers, Henderson - Hasselbach equation. Theory indicators principles of measurement of pH.

UNIT - II

ENZYME:

1)Enzymes as biological catalyst, IUB System of classification, specific activity, Km & V max, evaluation. Line weaver Burk Plott. Effect of ph & temperature on enzyme catalyzed reaction Enzyme inhibitors.

2) Isoenzyme.

HORMONES:

Mechanism of action of hormones insulin: glucagon, epinephrine, thyroid and steroid.

BIOLOGICAL OXIDATION

Enzymes of biological oxidation, redox potential, respiratory chain, oxidative phosphorylation, mitchell's oxidative phosphorylation.

UNIT – III

Carbohydrates

Glycolysis, citric acid cycle, its function in energy generation and biosynthesis of energy rich bond, pentose phosphate pathway and its regulation. glycogenesis and glycogenolysis, Cori cycle. Hormonal regulation of carbohydrate metabolism. Energetics of metabolic cycle.

UNIT -IV

A) Protein metabolism - General reactions of amino acid Metabolism- Transmination, decarboxylation, oxidative & non- oxidative deamination of amino acids. Urea cycle and its regulation.

B) Purine and pyrimidines: synthesis and break down.

C) Nucleic acid:DNA replication and transcription, DNA repairs systems DNA recombinant Genetic mutation, regulation of gene expression and protein bio-synthesis.

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UNIT-V

Lipids metabolism- Introduction, hydrolysis of tri-acylglycerols, a-b, w- oxidation of fatty acids. Oxidation of odd numbered fatty acids, fate of propionate, role of carnitine, degradation of complex lipids. Fatty acid biosynthesis. Lipid biosynthesis. Fatty liver, metabolism of adipose tissue and obesity. Metabolisms

of ketone bodies. Metabolism of cholesterol and its regulation Energetic of fatty acid cycle.

PRACTICAL

PART I

1. **Acid & Alkalis:** Preparation of dilute solutions of common acids & alkalis & determining their exact normalities.
2. **Buffers:-** Preparation of buffers and determination of their pH by use of indicators & pH meter.
3. **Application of Spectrophotometer**

PART II

1. Estimation of inorganic phosphorus in serum.
2. Estimation of ascorbic acid in foods.
3. Estimation of albumin, globulin & albumin/globulin ratio in serum.
4. Estimation of glucose in blood.
5. Estimation of cholesterol in blood.
6. Estimation of activity of alkaline phosphotase.

PAPER IX: Comunity Nutrition and nutritional deficiency TH-50, IA-50

UNIT – I a. Relationship between health, nutrition, community and society. Role of public nutritionists in health c are delivery.

b Programme Planning - Diagnosis of the situation, setting of objectives, suitability & implementation & evaluation. Policy analysis & operational Research.

Unit-II A) Communicable diseases : surveillance & treatment, Control of communicable diseases in emergencies-role of immunization & sanitation.

B) PEM - Indications of malnutrition, clinical signs for screening acute malnutrition. Indicators & cut-offs indicating seriously abnormal nutrition situations: weight and height based indices and social indicators.

UNIT – III

Prevalence, causes, signs, symptom and dietary management:

A).Vitamin A deficiency

B).Vitamin B1deficiency

C) Vitamin D and calcium deficiency

D) Vitamin C deficiency

UNIT - IV

Prevalence, causes, signs, symptom and dietary management

a. Vitamin B12, iron, folic acid deficiency

b. iodine deficiency

c flourosis

UNIT – V

A) Nutrition relief & rehabilitation.

B) Food distribution strategy-identification & reaching the vulnerable group-targeting food aid.

SEMESTER-III

PAPER XI : CLINICAL & THERAPEUTIC NUTRITION **TH-50, IA-50**

UNIT-I

Adaptation of normal diet, progressive diet - General & Modified Diets.
Nutritional support - special feeding methods.

UNIT-II

Incidence, etiology, pathology & metabolic aberrations, clinical manifestation, complications, dietary management & counseling of following diseases.

a.) Surgery & burns, trauma.
b.) Gastro - intestinal : peptic ulcer, ulceratives colitis, diarrhea, dysentery. .
c.) Liver & Gall bladder: hepatitis, liver cerrhosis, hepatic coma, stone.
d.) Allergy

UNIT-III

Etipathophysiology, metabolic & clinical aberrations, complications, prevention and dietary management of:

a. Cardiovascular
b. Renal : ARF, CRF, nephritic syndrome, glomerulonephritis, renal stone, ESRD, dialysis, overview of kidney transplant.
c. Metabolic - (a) Diabetes
   (b) Gout
d. Neurological disorders.

UNIT-IV

Disorders including inborn errors of metabolism & their nutritional management-

Abnormal hemoglobin, thalasemia, deficiency of Blood clothing factor, Phenyl ketonuria, Albinism, Alkapto nuria, Galactosemia, Lactose intolerance, Tay- Sach's disease intolerance, . Cretinism with goitre, wilson's disease, Menke's disease.

3. Alcoholism.

UNITV

Diet, nutrient and drug interaction: effect of drugs of ingestion, digestion, absorption and metabolism of nutrients, effect of drug dose on food, nutrients and nutritional status.

PRACTICAL

1. Planning, Calculation, Preparation, evaluation & dietary counseling for therapeutic diets covered in theory.
2. Preparation of diet counseling aids for common disorders.

PAPER XII :Institutional Food Administration TH-50, IA-50

Unit-I

Introduction of food service systems and their development.

Unit-II

Management-

a. Definition, Principles & functions of catering management,
b. Tools, styles, theories of management,
c. energy , time and work management
d. organization charts & its types.

Unit-III

1. Planning Layouts of space
2. Determining equipment, Selection, Placement maintenance & Layout of equipment.

UNIT IV

1. Menu Planning, Planning of material needed, its detection, storage, quantity food production.

2. Delivery and service of food in different system

3. Food cost control and quality assurance

Unit-V

Personnel Management - Manpower Planning, Placement, Recruitment, induction, training, motivation & performance appraisal.

PRACTICAL

1. Planning menus for quantity.
2. Cost analysis of menus.
3. Planning and Organization of meals for various occasions.
4. Analysis of food safety & hygiene.

PAPER XIII: FOOD PROCESSING & TECHNOLOGY **TH-50, IA-50**

UNIT - I

Processing technology of foods & nutritional implications for the following:

- Cereals & Pulses- Wheat grain characteristics and products, Rice processing, Pulses Processing & their elimination of toxic factors.

Fermentation & Germination

Nuts & Oilseeds- Nuts Oilseeds Processing, solvent extraction purification, hydrogenation and tempering products - butter, margarine etc

UNIT-II

- Flesh Foods: Processing & Their Products.

Milk and Milk Products:- Classification and standardization, Pasteurization, homogenization, packing of milk.

Milk Products- Fortified milk, Skim milk, Concentrated milks, Cream, Butter,

Cheese, Ice cream and Indigenous milk products: Khoa, Paneer, Curd, Yoghurt, Ghee.

UNIT-III

- Fruits & Vegetables: Physiological and biochemical changes during ripening, handling & storage & fruit processing. Processing of vegetables, canning, freezing, dehydration, pickles & chutneys.

b. Beverages & Appetizers : Classification, Coffee, Tea, coco chocolates, Fruit beverages, soups, Vegetable Beverages, Carbonated & Noncarbonated beverages, Alcoholic beverages.

UNIT-IV

a).Physical principles in Food Processing Operations:

b).Food Deterioration, Methods of Preservation and Processing: Thermal Processing, Refrigeration, Freezing, Dehydration, Ionizing radiations, Fermentation, concentration.

c).Chemical Principles of Food Processing:

d).Preservation/processing by sugar, salt, smoke, acid and chemicals.

e).Chemical & biochemical reactions affecting food quality & safety.

UNIT - V

Some Recent concepts in Food Technology -

- Biotechnology in food.
- Algae as food - Spirulina
- Low cost nutrient supplement.
- Packaging of foods.

PAPER XIV : NUTRITION FOR HEALTH & FITNESS TH-5O, IA-50

UNIT I

Definition components of specific fitness and health status. Energy input & output , diet & Exercise .Nutrition exercise ,physical fitness & health inter-relationship.

UNIT II

Review of different energy systems for endurance and power activity shifts in carbohydrate and fat metabolism. Mobilization of fat stores during exercise.

UNIT III

Nutrition in sports: sports specific requirements. Diet manipulation , pre-game & Post game meal . Life style and dietary management of stress.

UNIT IV

Significance of Physical fitness, nutrition and prevention of weight control, obesity, CV disorder and diabetes.

UNIT V

Alternative systems for health and fitness like Yoga, meditation.

SEMESTER IV

IN LIEU OF PAPER XVI – DISSERTATION

The thesis / dissertation / survey report / field work shall be written & submitted in four copies. Only such candidates shall be permitted to offer Dissertation (if provided in the scheme of the examination) in lieu of the paper as have secured at least 60% or more marks in the aggregate of all the papers prescribed for the previous examination.

The dissertation shall be of 500 marks. The distribution of 500 marks of Dissertation will be as under –

1. SEMINAR 1 (75 marks) Identifying topic and objectives
2. Seminar 2 (75 marks) review, methodology and pilot study
3. seminar 3 (100 marks) report writing and presentation
4. seminar 4 (150 marks) Pre – submission seminar
   (By the board of internal examiner)
5. Viva-voice on Dissertation 100 marks (By external examiner)

The board of internal examiners shall consist of

1. Principal or his/her nominee.
2. Head of the Department, &
3. Supervisor concerned.

The total of the three awards shall be taken as Final award.

N.B.- Where there is any difficulty in the constitution of the internal board according the procedure laid down above, the Principal will constitute the board.

OR

PAPER XVII Industry training(internship) with project report – 500 marks

1. SEMINAR 1 (75 marks) Identifying topic and objectives
2. Seminar 2 (75 marks) review,methodology and pilot study(in between training)
3. seminar 3 (100 marks) report writing and presentation
4. seminar 4 (150 marks) Pre – submission seminar
   (By the board of internal examiner)
5. Viva-voice 100 marks (By external examiner)