



Gujarat University

Design and Structure of Food Science and Nutrition; PG Courses for Credit Based Semester system to be implemented from June 2010 (New 2017)

Department	Semester	Course		No. of Hours per week				Course credits
		No	Name	Lectures	Others	Practicals	Total	
Food Science & Nutrition	1	<b>FSN401</b>	Nutritional Biochemistry	3	1		4	4
		<b>FSN 402</b>	Functional Properties of Food	3	1		4	4
		<b>FSN 403</b>	Molecular Cell Biology	3	1		4	4
		<b>FSN 404</b>	Human Nutrition and Nutrients	3	1		4	4
		<b>FSN 405PR</b>	Practical – I +Viva voce			6	6	4
		<b>FSN 406PR</b>	Practical – II +Viva voce			6	6	4
			Total	12	4	12	28	24
	2	<b>FSN 407</b>	Nutrition for Fitness and Life Cycle	3	1		4	4
		<b>FSN 408</b>	Nutritional Physiology	3	1		4	4
		<b>FSN 409</b>	Food Production Development & Marketing	3	1		4	4
		<b>FSN 410</b>	Food Science and Food Microbiology	3	1		4	4
		<b>FSN 411PR</b>	Practical – III +Viva voce			6	6	4
		<b>FSN 412PR</b>	Practical – IV +Viva voce			6	6	4
			Total	12	4	12	28	24
	3	<b>FSN 501</b>	Community Health Nutrition	3	1		4	4
		<b>FSN 502</b>	Research Methodology	3	1		4	4
		<b>FSN 503</b>	Clinical Nutrition & Dietetics	3	1		4	4
		<b>FSN 504</b>	Nutrition In Critical Care, Food Safety and Law	3	1		4	4
		<b>FSN 505PR</b>	Practical – V +Viva Voce			6	6	4
		<b>FSN 506PR</b>	Practical – VI +Viva Voce			6	6	4
			Total	12	4	12	28	24
	4	<b>FSN 507PT</b>	Dissertation / Project Work				20	16
		<b>FSN 508S</b>	Seminar / Field /Industrial visit				4	4
		<b>FSN 509M</b>	Assignment / Group Discussion				4	4
			Total				28	24

### M. Sc. Semester I

Course No.	Course Name	Hours Per Week	Credits	Marks		
				Internal	External	Total
FSN 401	Nutritional Biochemistry	04	04	30	70	100
FSN 402	Functional Properties of Food	04	04	30	70	100
FSN 403	Molecular Cell Biology	04	04	30	70	100
FSN 404	Human Nutrition and Nutrients	04	04	30	70	100
FSN405PR	Practical – I +Viva voce	09	04	30	70	100
FSN406PR	Practical – II +Viva voce	09	04	30	70	100
	Library	02	-	-	-	-
<b>Total</b>		<b>36</b>	<b>24</b>	<b>180</b>	<b>420</b>	<b>600</b>

### M. Sc. Semester II

Course No.	Course Name	Hours Per Week	Credits	Marks		
				Internal	External	Total
FSN 407	Nutrition for Fitness and Life Cycle	04	4	30	70	100
FSN 408	Nutritional Physiology	04	4	30	70	100
FSN 409	Food Production Development & Management	04	4	30	70	100
FSN 410	Food Science and Food Microbiology	04	4	30	70	100
FSN 411PR	Practical – III +Viva voce	09	4	30	70	100
FSN 412PR	Practical – IV +Viva voce	09	4	30	70	100
	Library	02	-	-	-	-
<b>Total</b>		<b>36</b>	<b>24</b>	<b>180</b>	<b>420</b>	<b>600</b>

### M. Sc. Semester III

Course No.	Course Name	Hour Per Week	Credits	Marks		
				Internal	External	Total
FSN 501	Community Health Nutrition	04	04	30	70	100
FSN 502	Research Methodology	04	04	30	70	100
FSN 503	Clinical Nutrition & Dietetics	04	04	30	70	100
FSN 504	Nutrition In Critical Care, Food Safety and Law	04	04	30	70	100
FSN505PR	Practical – V +Viva Voce	09	04	30	70	100
FSN506PR	Practical – VI +Viva Voce	09	04	30	70	100
	Library	02	-	-	-	-
<b>Total</b>		<b>36</b>	<b>24</b>	<b>180</b>	<b>420</b>	<b>600</b>

### M. Sc. Semester IV

Course No.	Course Name	Hours Per Week	Credit	Marks		
				Internal	External	Total
FSN507PT	Dissertation / Project Work	24	16	100	300 (200+100)	400
FSN 508S	Seminar / Field /Industrial visit	06	4	50	50	100
FSN 509M	Assignment / Group Discussion	06	4	50	50	100
<b>Total</b>		<b>36</b>	<b>24</b>	<b>200</b>	<b>400</b>	<b>600</b>

### M. Sc.

Semester.	Course Name	Hours Per Week	Credit	Marks		
				Internal	External	Total
I	Principles of Food Sciences	36	24	180	420	600
II	Principles of NutritionI	36	24	180	420	600
III	Research Methodology and Clinical Nutrition	36	24	180	420	600
IV	Dissertation & Seminar+ Assignment	36	24	200	400	600
<b>Total</b>		<b>144</b>	<b>96</b>	<b>740</b>	<b>1660</b>	<b>2400</b>

#### Examinations for the 4<sup>th</sup> semester

##### Dissertation

##### Internal Examination

70 marks are based on day-to-day work of the concern student in terms of experimental designing, Practical performance in the laboratory, interpretation of the results obtained, regularity etc.

Internal 30 marks viva: Presentation of the work in front of the faculty of the department at least 3 times during this project work as follows.

- (1) Deciding of the project and state of the art presentation .....10 marks
- (2) Discussion of the materials and methods and protocols..... 10 marks
- (3) Presentation of the obtained results .....10 marks

##### External Examination

- (1) 200 marks examination of the dissertation by two examiners 100 marks each
- (2) 100 marks viva-voce conducted by examiners

#### Evaluation of seminars and assignments/ training reports/ study tour report etc

Internal: 50 marks for the presentation of seminar which includes content, presentation slides, explanation, understanding of the topic and response to the raised questions (10 marks each)

External: 50 marks evaluation of the prepared hard copy of the seminar and viva (marks distribution: 30 marks for viva and 20 marks for the report).

## SEMESTER I

### ❖ FSN 401: NUTRITIONAL BIOCHEMISTRY

#### **Unit – 1 : Energy, Enzyme and Thermodynamics:**

- Acids , Bases , Salts , pH , Ionization constants (pka),
- Concepts of internal energy, enthalpy, and entropy,
- First and second Law of thermodynamics,
- Free energy and their applications in bioenergetics processes.
- Enzyme-Classification, nomenclature, general properties- stereo and reaction specificity,
- Kinetics and mechanisms of enzyme action,
- Regulation of enzyme activity, Enzyme inhibition,
- Coenzymes and cofactors, their structure and functions.
- Isoenzymes, immobilized enzymes,

#### **Unit – 2 : Biomolecules – I:**

- Carbohydrate - Classification, Structure and properties of carbohydrates,
- Monosaccharides and related compounds, disaccharides, polysaccharides,
- Inter conversion of hexoses, sugar derivatives of biomedical importance
- Lipids – Classification, Structure and properties of fatty acids, triglycerides, Phospholipids and derivatives, Cholesterol and derivatives,
- Dietary fats, biological functions of lipids, glycolipids.

#### **Unit – 3 : Biomolecules – II:**

- Amino acids - Classification and structure, properties, reactions and identification techniques, Isoelectric points of amino acids,
- Formation of peptide linkages, amide plane and biological activity,
- Protein - Structure and organization,
- Physico-chemical properties and functional diversity of proteins,
- Nucleic acids – Components, structure and level of organization, Physico-chemical properties, biological importance,
- Structure and polymorphism of DNA.

#### **Unit – 4 : Metabolism:**

- Integration and regulation of metabolism: Interrelationship of carbohydrate, protein and lipid metabolism, role of liver, muscle and adipose tissues;
- Metabolic pathways of macronutrients: Carbohydrates: Aerobic and anaerobic degradation, glycogenesis, glycogenolysis, gluconeogenesis, HMP shunt pathway.
- Hormonal regulations of blood glucose.
- Protein and amino acids: protein degradation, fate of nitrogen (urea cycle), metabolism of aromatic, sulfur containing, BCAA and other amino acid pool. Glutamine and alanine cycle, protein biosynthesis.
- Lipids: Metabolism of triacylglycerol,  $\beta$  oxidation of fatty acids, cholesterol. Regulation of lipid metabolism and ketone bodies.
- Nucleic acids: metabolism of nucleic acid components, biosynthesis of nucleotides.

### ❖ FSN 402: FUNCTIONAL PROPERTIES OF FOODS

#### **Unit – 1: Food Quality Evaluation:**

- Meaning and introduction, subjective and objective evaluation
- Sensory evaluation-physiological base of sensory evaluation, sensory characteristics of food, requirement of test panel, selection of panel members techniques
- Types of sensory evaluation test

- Objective evaluation: evaluation of volume, specific gravity, wettability, tenderness, rheological properties, color.

**Unit – 2: *Properties of Foods:***

- Physico-chemical properties of foods- Organic food components, colloids, osmotic pressure, food dispersions (sols, gels, emulsion, foam), Hydrogen ion concentration etc.
- Functional properties of proteins: modified proteins, application in product formulation.
- Role of water in foods: free water and bound water, functional properties, water activity and intermediate moisture foods.
- Starch, hydrocolloids and gums: occurrence, functions in food systems, properties, gelatinization, retro gradation and modified starches.

**Unit – 3: *Composition of Foods:***

- Structure/composition, processing, techniques and role in cookery
- Cereals, millets and cereal products, pulses and legumes, nuts and oil seeds,
- Milk and milk products,
- Meat-fish-poultry; Fats and oils
- Vegetables and fruits,
- Sugars and related products

**Unit – 4: *Processing:***

- Enzymes in food processing
- Brief manufacturing process: coffee, tea, cocoa,
- Alcoholic beverages (fruit wines), Ready to serve beverages.
- Effect of processing on components, properties and nutritional value of foods

❖ **FSN 403: MOLECULAR CELL BIOLOGY**

**Unit – 1: *Evolution of the Cell:***

- Cell as a unit of living organisms; Diversity of cell size and shapes,
- Structure of Prokaryotic and Eukaryotic cells, Single cell to multicellular organism
- Cell - Cell interactions; Cell adhesions, and cell junctions
- Molecular Basis of the Cell and Macromolecular recognition process,
- Cell cycle and cell division

**Unit – 2 : *Biomembrane and Cytoskeleton:***

- Molecular organization of Biomembrane: Ultrastructure and molecular composition of membrane,
- Physical and Dynamic properties of membrane,
- Movement of molecules/ions across Biomembrane and Human perspective-defects in ion channels.
- Cytoskeleton topography: Membrane Cytoskeleton interactions,
- Microtubule and its dynamics, motor proteins,
- Microfilament and its functions, Intermediate filaments and their functions

**Unit – 3: *Cell Organelles I:***

- Molecular organization of Mitochondria
- Respiratory Chain Complexes – Organization and Stoichiometry,
- Q- cycle, Mechanism of Oxidative Phosphorylation, uncouplers and inhibitors;
- Molecular organization of Chloroplast,
- Photosynthetic pigments, Photosystem I & II

#### **Unit – 4: *Cell Organelles II:***

- Nucleus – Organization, compositions and functions
- Molecular Organization and functions of: Endoplasmic reticulum,
- Golgi complex,
- Lysosomes and disease;
- Microbodies: Peroxisomes,
- Ribosomes,

#### **❖ FSN 404: HUMAN NUTRITION AND NUTRIENTS**

##### **Unit – 1: *Basic of Nutrition:***

- Basis for computing nutrient requirements:
- Latest concepts in dietary recommendations, RDA- ICMR and WHO: their uses and limitations.
- Body fluids and water balance: Body water compartments. Regulation of water balance, disorders of water balance.
- Body composition: Methods of study, compositional changes during life cycle, nutritional disorders and their effect on Body composition.

##### **Unit –2: *Macronutrients in Human Nutrition:***

- Carbohydrates: sources, physiological functions, digestion and absorption, factors influencing metabolism. Role of dietary fiber in health and disease.
- Disorders related to carbohydrate metabolism.
- Lipids: sources, physiological functions, digestion and absorption, EFA, SFA, MUFA, PUFA- importance in human nutrition
- Role of lipoproteins, cholesterol and triglycerides in health and disease.
- Proteins: Concepts of essential and non-essential amino acids- their role in growth and development. Physiological functions of proteins.
- Requirements, nitrogen balance concept. Methods for evaluating protein quality, protein turnover
- Non-nutrient component of food and its association with health.

##### **Unit – 3: *Micronutrients in Human Nutrition:***

- 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
- Macro minerals: Calcium, Phosphorus Magnesium, Sodium, Potassium, chloride.
- Micro minerals: Iron, Zinc, copper, selenium, chromium, iodine, manganese, Molybdenum and fluoride.
- Ultra trace minerals: Arsenic, Boron, Nickel, Silicon, Vanadium & cobalt: Digestion & absorption, Functions, Toxicity, interaction with other nutrients.
- Fat soluble Vitamins: Vitamin A, Vitamin D, E & K.
- Water soluble vitamins: Vitamin C, Thiamine, Riboflavin, Niacin, Pantothenic acid, Biotin, Folic acid, Vitamin B12, VitaminB6.

##### **Unit – 4: *Regulation of Nutrients Metabolism:***

- Regulation of food intake: role of hunger and satiety centers.
- Energy metabolism: Basal and resting metabolism- influencing factors.
- Methods to determine energy requirements & expenditure.
- Thermo genesis, adaptation to altered energy intake,
- Latest concepts in energy requirements and recommendations for different age groups.

❖ **FSN 405PR** : **Practical and Viva voce based on FSN 401 & FSN 402;**

❖ **FSN 406PR** : **Practical and Viva voce based on FSN 403 & FSN 404;**

## **SEMESTER II**

❖ **FSN 407** : **NUTRITION FOR FITNESS AND LIFE CYCLE;**

### **Unit – 1: Nutrition During Life Cycle:**

- Infant nutrition: growth and development of infant, nutritional requirements and nutritional problems during infancy
- Nutrition guidelines and nutrient requirement for maintenance of health during life cycle: childhood, adolescent, adulthood and old age

### **Unit – 2: Nutritional Status:**

- Factors influencing dietary intake: Food habits, food fads and fallacies, their influence on health and wellbeing.
- Definition of health and fitness, Factors influencing health and wellbeing Gender and health.
- Nutritional status: Definition, methods to assess nutritional status- (Relevant to maintenance of fitness),
- Specific fitness and health status.

### **Unit – 3: Nutrition in Health, Fitness and Sports Nutrition:**

- Holistic approach to the management of fitness and health
- Review of different energy systems for endurance and power activity
- Sports specific requirement
- Diet manipulation: carbohydrate loading
- Pregame and post-game meals

### **Unit – 4: Sports, Yoga and Health:**

- Assessment of different Ergogenic aids and commercial supplements and sports drink
- Water and electrolyte balance, losses and their replenishment during exercise and sport event, effects of dehydration
- Nutrition during stress, injury and fracture
- Awareness about the alternative systems for health and fitness, like Ayurveda, yoga, Meditation, vegetarianism and traditional diets.

❖ **FSN 408** : **NUTRITIONAL PHYSIOLOGY;**

### **Unit – 1 : Movement and Coordination:**

- Organization of Body
- Structure of skeletal, cardiac and smooth and Physiology of muscle contraction.
- Structure of Brain and Neurons.
- Physiology of nerve impulse conduction, excitability of membranes, electrical and chemical transmission between cells.
- Sensory organs and their functions.
- Hormones: Classification, synthesis, regulatory functions and mechanism of hormone action. Prostaglandin- structure, biosynthesis, metabolism and biological action and their role in pathology.



**Unit – 2 : Digestion and Respiration:**

- Physiological basis of Nutritional Biochemistry,
- Structure of digestive tract, enzymes in digestion, regulators of GI activity, mechanical and biochemical aspects of digestion, absorption and transport of major nutrients.
- Liver: Role of liver in processing and distribution of nutrients absorbed from SI, inter relationship of major metabolism in liver, excretory functions and storage.
- Structure of Lung, Physiology of respiration
- Exchange and transport of gases and its regulation.

**Unit – 3 : Transport and Defence:**

- Blood: Composition- plasma, blood cells, haemoglobin, blood clotting process.,
- Heart : beat, initiation , conduction and regulation
- Physiology of Circulation
- Adipose tissue: Structure, composition, deposition of triglycerides in adipose tissue, formation of fat stores from non-lipid and dietary lipids, role of brown adipose tissues in thermo genesis.
- Immunity: Immune response, antibody, cell mediated and humoral immunity complement system.

**Unit – 4 : Excretion Detoxification and Reproduction:**

- Internal structure of Kidney and Nephron; Fluid and electrolytes balance, Acid Base balance; Physiology of Excretion, Roles of kidney in body water regulation.
- Detoxification: Definition, xenobiotics, enzyme systems involved mechanism of detoxification.
- Oxidative stress and Antioxidants: Free radicals: definition, formation in biological systems, Role of free radicals and antioxidants in health and disease. Determination of free radicals, lipid peroxides and antioxidants.
- Metabolic adaptation during starvation, exercise, stress and diabetes mellitus.
- Reproduction: Female and male reproductive organs – structure and functions; Reproductive health and nutritional requirements

❖ **FSN 409 : FOOD PRODUCT DEVELOPMENT AND MARKETING;**

**Unit – 1 : Product Strategies:**

- **Product Development** - Designing new product - types and drawing forces, Need for product development, Stages of product development, Success in product development, Consumer research, Role of sensory evaluation in consumer product acceptance.

**Unit – 2 : Food Trends:**

- Changing food trends and consumer behavior in purchasing foods.
- Life style changes: economic, socio-cultural,
- Psychological influences and marketing influences.
- Introduction to advanced technologies used in food processing - agglomeration, agitation, air classification,
- Membrane technology (reverse osmosis and ultra filtration), high pressure, surface heat exchanger, ohmic resistance heating, super critical extraction.

**Unit – 3 : Food Packaging:**

- Food fortification - objectives, principles, and technologies.
- Food packaging - Principles in the development of safe and protective packing,
- Packaging materials (metals, glass, paper and plastics) use of packaging in extending shelf life of unprocessed foods (modified atmosphere packaging, Biodegradable plastics).

- Sweetening agents: Natural and artificial sweeteners, composition, use.
- Food additives: Functions and uses in processed food products.
- Chemical, technological and toxicological aspects.
- Food Flavors: Spices and flavoring constituents, flavors in food industries.

**Unit – 4 : Food Service Management:**

- Types of food services
- Commercial, Welfare & Transport
- Organization based menu planning
- Resource management
- Management of Time, energy and Money

❖ **FSN 410 : FOOD SCIENCE AND FOOD MICROBIOLOGY**

**Unit – 1 : Quality Criteria and Safety of Foods:**

- Introduction and Types of Criteria
- ICMSF Sampling plans
- Plan Stringency and Problems involved,
- HACCP approach,
- Quality Assurance and Production Control,

**Unit – 2 : Principles of Food Microbiology:**

- Scope and development of Food microbiology,
- Sources of Microorganisms in food,
- Factors influencing Microbial growth in Food,
- Microbial Examination of Food,
- Beneficial activities of microbes in foods: Fermented foods, Probiotics,

**Unit – 1 : Food Spoilage:**

- Classification of food in relation to shelf life: Spoilage in food and its control:
- Spoilage caused by microorganisms (bacteria, fungi, and virus), enzymes, pests and rodents.
- Contamination and spoilage of: Cereals and pulses; sugar and sugar products; vegetables and fruits; flesh foods; eggs; milk and milk products.

**Unit – 4 : Principles of Food Preservation:**

- Principles of food preservation and their application
- Practice of Cleaning and Sanitation,
- Food dehydration and concentration
- Use of high temperature and Canning in Food Preservation,
- Use of Low temperature in Food Preservation,
- Use of Drying , Irradiation, Modified Atmosphere and Chemical preservatives,
- Food irradiation and microwave heating.
- Hurdle Concept

❖ **FSN 411PR : Practical and Viva voce based on FSN 407 & FSN 408;**

❖ **FSN 412PR : Practical and Viva voce based on FSN 409 & FSN 410;**

## SEMESTER III

### ❖ FSN 501: COMMUNITY HEALTH AND NUTRITION;

#### **Unit-1: Introduction to Public Health Nutrition: (Concept of Public Health Nutrition)**

- Relationship between health and nutrition, Role of public health nutritionists in the health care delivery.
- Determinants of health status, vital statistics-mortality, morbidity rate and life expectancy.
- 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:**

- Common nutritional problems in the community: etiology, prevalence, clinical manifestation and assessment of macronutrient malnutrition (PEM)
- Micronutrient malnutrition-vitamin-A, iron, iodine, and zinc its prevention measures.
- Nutrition and infection.

#### **Unit-3: Maternal Nutrition:**

- **Nutrition during pregnancy:** Physiological changes and nutritional requirements in pregnancy .Effect of malnutrition on pregnancy out come.
- **Nutrition during lactation:** nutritional requirement during lactation
- Breast feeding and its implication, hazards of bottle feeding Human milk v/s milk formula. Weaning and complementary food practices FSSAI standards for Baby food, nutritional and functional properties of complementary food.

#### **Unit -4: Role of National and International Organization:**

- National organization – ICMR, ICAR, CSWB, SSWB, NIN, CSIR. Other nutrition intervention programmes for control of 1. Energy Malnutrition 2. Vitamin A Deficiency 3. Anemia Prophylaxis 4. Goiter control 5. Fluorosis 6. Epidemic Dropsy 7. Lathyrism
- International organization- FAO,WHO,UNICEF,AFPRO,WORLD BANK CARE
- Their role in combating malnutrition, Food and nutrition security

### ❖ FSN 502: RESEARCH METHODOLOGY:

#### **Unit – 1: Biostatistics:**

- Types of data, concepts of population, sample and sampling techniques. basic probability theory and theory of distribution
- Analysis of data: graphical and diagrammatic presentation, measures of central tendencies-mean, median, mode. Measures of dispersion-range, mean deviation and standard deviation, simple linear correlation and regression, tests of significance-‘t’ test and chi square test
- Methods of data collection: Schedules and questionnaire, survey, interview, case study, home visits, and scaling methods. Reliability and validity of measuring tools.
- Access to sequence database on the internet.

#### **Unit - 2: Research methods:**

- Research methodology: Meaning, objectives and types of research, significance of research. Definition and identification of a research problem, justification, theory and hypothesis.

- Research design: Features of a good design, concepts of variables, experimental and control groups. Hypothesis testing
- Interpretation: Meaning of interpretation and techniques. Interpretation of tables and figures.
- Reporting: Significance of report writing, steps in report writing and types of reports.

**Unit – 3: *Isolation and separation techniques:***

- **Centrifugation:** Theory and principles of centrifugation, sedimentation velocity and sedimentation equilibrium, types of centrifugation and centrifuge machines, differential centrifugation, density gradient centrifugation and ultra centrifugation.
- **Chromatography:** Principles of chromatographic separation, principles and application of Paper, Gel-permeation, ion exchange, affinity and thin layer chromatography(TLC) and HPLC.
- **Electrophoresis:** Principles and factors affecting separation,
- Principles and application of paper, starch, agarose, polyacrylamide and gel electrophoresis

**Unit – 4: *Microscopic and analytical technique:***

- **Microscopy:** Principles, working and application of bright field and dark field microscopy, Contrast and interference, fluorescence microscopy, confocal microscopy, specimen
- Fixation, processing and staining in light microscopy. Electron microscopy-TEM, SEM, STEM. Cryo-electron microscopy etc.
- **Spectroscopic methods:** pH meter-electrochemistry principles and application, Principles of spectroscopy, electromagnetic spectrum, absorption of light. Colorimeter in UV and visual range, flame photometer and fluorimeter.
- **Radiochemical methods:** Principles and application of tracer techniques in biology, RIA, IRMA, EIA, and radio receptor assays.
- Basics of Molecular Biology Techniques

❖ **FSN 503: CLINICAL NUTRITION AND DIETETICS**

**Unit – 1: *Introduction to Clinical Nutrition:***

- Definition and history of dietetics, Dietetics in modern health care management
- Principles of planning a normal diet, objectives of diet therapy
- Role of dietitian- functions and classification of a dietitian. Team approach in patient care, interpersonal relationship with patients.

**Unit – 2: *Dietary Management in Common Disease Conditions:***

- Febrile diseases- acute and chronic fever, tuberculosis, poliomyelitis, typhoid, malaria, HIV/AIDS
- Gastrointestinal disorder-etiology symptoms and treatment of gastritis, peptic ulcer, diarrhea, constipation, dumping syndrome, malabsorption syndrome, steatorrhea irritable bowel syndrome, ulcerative colitis, diverticulosis, crohn's disease etc.
- Liver diseases-Infective hepatitis .cirrhosis, chole cystis, chole lithiasis, hepatic encephalopathy and liver transplant.
- Renal diseases- nephritis and nephrosis, acute renal failure, chronic renal failure, urolithiasis, dialysis, renal transplant.

**Unit – 3: *Dietary Management in Degenerative, Metabolic and other Diseases:***

- Obesity and its clinical manifestation.
- Cardiovascular diseases-Role of fat in the development of atherosclerosis, risk factors, hypercholesterolemia, dyslipidemia, physical activity and heart disease. Dietary management in short term and long term treatment in coronary diseases.
- Hypertension- causes, symptoms, implication and prevention.

- Diabetes mellitus- Hyper and hypoglycemia, symptoms, diagnosis, treatment and prevention. Glycemic index and glycemic load. Complications in diabetes.
- Inborn errors of metabolism-phenyl ketonuria, fructosuria, galactosemia, maple syrup urine disease.
- Diet in burns

**Unit – 4: *Recent Trends in Nutrition:***

- Principles of dietary management in gout, rheumatism,
- Cancer-risk factors, symptoms, dietary management, role of food in prevention of Cancer.
- Role of functional foods, health foods and novel foods, organically grown foods, recent concepts in human nutrition like nutrigenomics, nutraceuticals etc.
- Nutrients and drug interaction: mechanism of action, contraindications and effect on food and nutrition

❖ **FSN 504: NUTRITION IN CRITICAL CARE, FOOD SAFETY AND FOOD LAWS:**

**Unit-1: *Nutritional Care of Hospitalized Patients:***

- Hospital malnutrition, screening and nutritional assessment, nutritional care plan, implementation of nutritional care.
- Metabolic response and adaptation to starvation, infection, trauma and surgery- (carbohydrate protein and fat metabolism)
- Assessing the nutritional status in critically ill patients: anthropometry, biochemical, clinical and dietary.

**Unit – 2: *Medical Nutrition Therapy:***

- **Enteral nutrition:** Types, routes, composition of feeds, precautions while feeding
- **Parenteral nutrition:** Types modes and composition of feeds and precautions while feeding. Complications of parenteral and enteral therapy, refeeding syndrome.
- Palliative care and rehabilitation diets in stages.
- **Nutrition in critical care:** mechanical ventilation, hepatic insufficiency, trauma, sepsis, MOF (multiple organ failure) other life saving measures for the critically ill. Role of immunonutrition,

**Unit – 3: *Nutritional Support System in Relief and Rehabilitation:***

- Surveillance of nutritional status in emergency relief situations such as flood, cyclone, earthquake, drought, war etc.
- Assessment of food needs, food distribution strategy, mass and supplementary feeding, special foods/ rations for nutritional relief, organizations for mass feeding/food distribution, transportation and storage, feeding centers, sanitation and hygiene.

**Unit – 4: *Food Safety, Food Laws and Entrepreneurship:***

- Food safety and quality control in food industries, physical, biological, and chemical hazards to food supply, bioterrorism a threat to food safeties
- Regulation of food safety, food labeling, food laws and food adulteration with respect to India
- Waste disposal in food industries.
- Entrepreneurship and marketing - starting and managing an enterprise,
- Entrepreneurship, advertising, marketing.

❖ **FSN 505PR : Practical and Viva voce based on FSN 501 & FSN 502:**

❖ **FSN 506PR : Practical and Viva voce based on FSN 503 & FSN 504:**

## SEMESTER IV

### ❖ **FSN 507PT: DISSERTATION/ PROJECT WORK**

Students are supposed to carryout field / laboratory training cum experimental works and prepare a comprehensive report along with a research proposal for future career. The area should include from basics to latest developments and discoveries, which will impart a broad training in various disciplines of Life Sciences and Biotechnology, these students will be able to pursue careers in pharmaceutical industries, research laboratories, clinical research organizations, school, colleges and Universities as researcher or academician.

### ❖ **FSN 508S : SEMINAR / FIELD / INDUSTRIAL VISIT**

Students should deliver seminar and attend the same at regular basis from syllabus, topics from recent advances in the subject and from prepared review of few research articles from research Journals. Students are also required to visit nature for diversity, research institutes and industries for real exposure in subject and qualitative interactions to understand applications of the subject. If possible a study tour during the span of two years may be organized pertaining to different Life Sciences/ Microbiological/ Environmental/ Biotechnological/ Pharmaceutical industries/ research institutes/ various ecosystems, even outside Gujarat State. The study tour is highly essential for study various concepts, processes and technology pertaining to Life Sciences.

### ❖ **FSN 509M : ASSIGNMENT AND GROUP DISCUSSION**

Department will allocate the assignment from the subject and related areas to each student every week and arrange every week group discussion between students and also between faculties and students.

### **Reference Books and Suggested Reading**

No.	Book	Author	Publisher	Year
1.	Biochemistry	J. M. Berg, J. L. Tymoczko & L. Stryer	N. H. Freewant & Co., NY	2004
2.	Biochemistry & Microbiology	Elliot & Elliot	Oxford Press, Oxford	2005
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