VIDYASAGAR UNIVERSITY

Curriculum for 3-Year BSc (General)
in

Nutrition

Under Choice Based Credit System (CBCS)
[w.e.f 2018-2019]

VIDYASAGAR UNIVERSITY

B Sc (General) in Nutrition

[Choice Based Credit System]

Year	Semester	Course Type	Course Code	Course Title	Credit	L-T-P	Marks		
1	I	SEMESTER-I					CA	ESE	TOTAL
		Core-1 (DSC-1A)		Nutritional aspect of food items. . - **Lab**	6	4-0-4	15	60	75
		Core-2 (DSC-2A)		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		Core-3 (DSC-3A)		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		AECC-1 (Elective)		English/MIL	2	1-1-0	10	40	50
				Semester - I : Total	**20**				**275**
	II	SEMESTER-II							
		Core-4 (DSC-1B)		Nutrients and its physiological role - **Lab**	6	4-0-4	15	60	75
		Core-5 (DSC-2B)		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		Core-6 (DSC-3B)		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		AECC-2 (Elective)		Environmental Studies	4		20	80	100
		Semester - 2 : Total			**22**				**325**

Year	Semester	Course Type	Course Code	Course Title	Credit	L-T-P	Marks		
2	III	SEMESTER-III					CA	ESE	TOTAL
		Core-7 (DSC-1C)		Nutrition: Infancy to old age - **Lab**	6	4-0-4	15	60	75
		Core-8 (DSC-2C)		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		Core-9 (DSC-3C)		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		SEC-1		TBD	2	1-1-0/ 1-0-2	10	40	50
		Semester - 3 : Total			**20**				**275**
	IV	SEMESTER-IV							
		Core-10 (DSC-1D)		Nutritional Surveillance and programme - **Lab**	6	4-0-4	15	60	75
		Core-11 (DSC-2D)		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		Core-12 (DSC-3D)		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		SEC-2		TBD	2	1-1-0/ 1-0-2	10	40	50
		Semester - 4 : Total			**20**				**275**

Year	Semester	Course Type	Course Code	Course Title	Credit	L-T-P	Marks		
3	V	SEMESTER-V					CA	ESE	TOTAL
		DSE-1A		Discipline-1(Nutrition)	6	4-0-4/ 5-1-0	15	60	75
		DSE-2A		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		DSE-3A		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		SEC-3		TBD	2	1-1-0/ 1-0-2	10	40	50
		Semester - 5 : Total			**20**				**275**
	VI	SEMESTER-VI							
		DSE-1B		Discipline-1(Nutrition)	6	4-0-4/ 5-1-0	15	60	75
		DSE-2B		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		DSE-3B		Other Discipline/TBD	6	4-0-4/ 5-1-0	15	60	75
		SEC-4		TBD	2	1-1-0/ 1-0-2	10	40	50
		Semester - 6 : Total			**20**				**275**
	Total in all semester				**122**				**1700**

CC = Core Course , **AECC** = Ability Enhancement Compulsory Course , **GE** = Generic Elective , **SEC** = Skill Enhancement Course , **DSE** = Discipline Specific Elective , **CA**= Continuous Assessment , **ESE**= End Semester Examination , **TBD**=To be decided , **CT** = Core Theory, **CP**=Core Practical , **L** = Lecture, **T** = Tutorial ,**P** = Practical , **MI**L = Modern Indian Language , **ENV**S = Environmental Studies ,

LIST OF CORE & ELECTIVES

CORE COURSE (CC)

DSC-1A: Nutritional aspect of food items.
DSC-1B: Nutrients and its physiological role
DSC-1C: Nutrition: Infancy to old age
DSC-1D: Nutritional Surveillance and programme

DISCIPLINE SPECIFIC ELECTIVE (DSE)

DSE- 1: Food Microbiology and Food Borne Illness
Or
DSE- 1: Food Standard and Food Safety Guidelines
Or
DSE-1: Dietetics and Counselling

DSE- 2: Community Nutrition and Epidemiology
Or
DSE-2: Personnel Management
Or
DSE-2: Computer Application and Research Methodology

SKILL ENHANCEMENT COURSE (SEC)

SEC- 1: Diet Therapy – 1

SEC- 2: Diet Therapy-II

SEC-3: Basic Molecular Biology and Immunology
Or
SEC- 3: Toxicology and Public Health

SEC- 4: Biostatistics and Bioinformatics
Or
SEC-4: Nutrition and Fitness
Or
SEC-4: Women Health and Nutrition

CORE COURSE (CC)

DSC-1A (CC- 1): Nutritional aspect of food items. **Credits 06**

DSC1AT : Nutritional aspect of food items. **Credits 04**

Course Contents:

1. Concept and definition of terms:

- Food, Food Groups, Food Pyramid, Functions of food.
- Nutrient and Nutritive value, Concept of Balanced Diet.

2. Cereals, **Pulses and legumes:**

- Nutritional aspects of wheat, rice and oat.
- Types of pulses and legumes, uses, and nutritional aspects.

3. Milk and milk Products:

- Nutritive value of milk, composition of milk,
- Types of processed milk, milk products (butter, curd, paneer and cheese), Pasteurization.

4. Egg, **Fish and meat:**

- Nutritional aspects and uses.
- Nutritional aspects of edible fish and meat, concept of red and white meat.

5. Vegetables and fruits:

- Uses and nutritional aspect of commonly available vegetables.
- Fresh fruits and dry fruits– raw and processed product.

6. Salts, **Fats and oils:**

- Uses and nutritional aspects of various salts.
- Types, sources, use and nutritional aspects of fats and oils.

7. Methods of cooking:

- Dry, moist, frying and microwave cooking.
- Effect of various methods of cooking on foods, nutrient losses in cooking.

DSC1AP: Practical **Credits 02**

Food preparation and nutritive value as per portion size wherever applicable -

1. **Beverages:** Lassi

2. **Cereals:** Fried Rice
3. **Milk and milk products:** Payasam
4. **Eggs:** Egg pudding
5. **Snacks:** Sandwiches

Suggested Readings:

1. Hughes O, Bennion M (1970). Introductory Foods, Macrnillan & Co. New York.
2. Lavies S (1998). Food Commodities.
3. Pomeranz Y (Ed) (1991). Functional Properties of Food Components, (2nd edition), Academic Press, New York.
4. Tindall HD (1983). Vegetables in the Tropics, MacMillan Press, London.
5. Winton AL, Winton KB (1999). Techniques of Food Analysis. Allied Scientific Publishers.
6. Winton AL, Winton KB (1999). Techniques of Food Analysis. Allied Scientific Publishers.

DSC-1B (CC- 2): Nutrients and its physiological role **Credits 06**

DSC1BT: Nutrients and its physiological role **Credits 04**

Course Contents:

1. Concept and definition of terms:
Growth, Development, Nutrition, Malnutrition and Health, Scope of Nutrition.

2. Introduce of protein, carbohydrate and fats
Dietary sources, physiological role and deficiency disorders.

3. Role of Vitamins and Minerals:

- Fat soluble vitamin-Physiological role, dietary sources and deficiency disorders.
- Water soluble vitamin- Physiological role, dietary sources and deficiency disorders.
- Minerals-Physiological role, dietary sources and deficiency disorders in special references to calcium, iron, sodium and potassium.

4. Principles of meal planning:

- Food exchange list, Factors affecting meal planning and food related behavior.
- Dietary guidelines for Indians.

5. Minimum nutritional requirement and RDA:

- Formulation of RDA, dietary guidelines with reference to man and woman.

6. Energy in human nutrition:

• Energy and its unit, Energy assessment and balance, Factors of energy requirement, BMR and its regulation, SDA of food**.**

DSC1BP: Practical **Credits 02**

1. Growth chart: Plotting and Interpretation using primary or secondary data in accordance with both ICMR and WHO Chart.
2. Clinical assessment and sign of nutrient deficiency disorders: Protein energy malnutrition (PEM), Anemia, Rickets, Goiter (Slide/Photography).
3. Clinical assessment and sign of vitamin deficiency disorders: Vitamin A, Vitamin C and Vitamin B-complex (Slide/Photography).
4. Clinical assessment and sign of obesity and metabolic disorders risk factors.

Suggested Readings:

1. Gopalan C (198). Nutritive value of Indian Foods. Indian Council of Medical Research.
2. Guthrie AH (1986). Introductory Nutrition, 6th Ed. The C.V. Mesby Company.
3. Indian Council of Medical Research (2003). Nutrient Requirements and Recommended-Dietary Allowance for Indians. New Delhi.
4. WHO (1979). A growth chart for International use in Maternal and Children Health Care, Geneva.
5. Winword (1988). Sear's Anatomy and Physiology for Nurses. London, Edward Arno ll.
6. Swaminathan M (2009). Essentials of Foods and Nutrition, Vols -1 and II. Ganesh and Co. Madras.

DSC-1C (CC- 3): Nutrition: Infancy to old age **Credits 06**

DSC1CT : Nutrition: Infancy to old age **Credits 04**

Course Contents:

1. Nutrition during infancy:
• Breast feeding, Formula feeding, Weaning, Supplementary foods, Nutritional management of Preterm baby.

2. Nutrition for children:
• Diet in early childhood, elementary school age, high school age.

3. Nutrition during pregnancy and lactation:
• Nutritional demands of Pregnancy, Food selection during Pregnancy, Complications of pregnancy and dietary management, Diet during Lactation.

4. Geriatric nutrition:
• Planning of meals for older people, Nutrition of aged persons, Physiological complications in geriatric group and dietary modifications required.

DSC1CP: Practical **Credits 02**

1. Preparation of normal diets for infant (Dahl soup).

2. Preparation of normal diets for preschool children (Dalia).
3. Preparation of normal diets for pregnant lady and lactating mother (Khicheri with mixed vegetables).

Note: In laboratory note book, calculation of nutritive value should be recorded according to portion size of specific diet for particular individual.

Suggested readings:

1. Hoar WS (1984). General and comparative Physiology. 3rd ed. Prentice-Hall of India.
2. Indian Council of Medical Research (2003). Nutrient Requirements and Recommended-Dietary Allowance for Indians. New Delhi.
3. Sherwood L (2004). Human Physiology: From cells to systems. 5th ed. Thomson Brooks Cole.
4. Swaminathan M (2009). Essentials of Foods and Nutrition, Vols -1 and II. Ganesh and Co. Madras.
5. Walker WA and Watkins JB (Ed.) (1985). Nutrition in Pediatrics, Boston, Little Brown & Co.
6. WHO (1979). A growth chart for International use in Material and Children Health Care. Geneva.
7. Wilson (1989). Anatomy and Physiology in Health and Illness. Edinburgh, Churchill Livingstone.

DSC-1D (CC- 4): Nutritional Surveillance and Programme **Credits 06**

DSC1DT : Nutritional Surveillance and Programme **Credits 04**

Course Contents:

1. Assessment of Nutritional Status and Surveillance:
- Direct Nutritional status assessment of human groups - Biochemical, Biophysical and anthropometric methods.
- Indirect assessment: Secondary sources of community health data.

2. Concept of surveillance systems:
- Role of international and national organizations and agencies (WHO, FAO, UNICEF, CARE, NIN, CFTRI, ICMR).

3. Communication in Nutrition and Health Education:
- Type, process and media of communication.
- Importance and relevance of Information, Education and communication (IEC) in Nutrition and Public Health..

4. National Nutritional Intervention Programmes:
- Objective, Target group, Scheme details - Integrated Child Development Services (ICDS), Mid Day Meal Programme (MDMP), Vit A prophylaxis Prophylaxis programme, Anemia prophylaxis programme.

5. Immunization Programme:

- Immunization: National Immunization schedule for children and adults, Immunization for foreign travelers.

DSC1DP: Practical **Credits 02**

1. Anthropometric measurement of Weight for age, height for age, weight for height and its comparison with reference value.
2. Determination of BMI and comments on results.
3. Measurement of circumference of chest, upper arm, waist - hip ratio.

Suggested Readings:

1. Jelliffe DB and Jelliffe EFP (1989). Community Nutritional Assessment, Oxford University Press
2. WHO. The growth chart: A tool for use in infant and child health care. Geneva: WHO; 1986.
3. Gopalan C (1992). Growth charts in Primary Health Care – Time for Reassessment. NFI Bulletin.
4. Ghosh S (1997). Nutrition and child care – A practical guide. 1st ed. Jaypee Brothers; New Delhi.
5. NIPCCD. Growth Monitoring Manual. 1st ed. Deptt. Of Women and child development. Ministry of HRD: 1988.

DISCIPLINE SPECIFIC ELECTIVE (DSE)

DSE- 1: Food Microbiology and Food borne Illness **Credits 06**

DSE1T: Food Microbiology and Food borne Illness **Credits 04**

Course Contents:

1. Introduction of Microbiology:

Introduction of microbiology and its relevance to everyday life. General characteristics of bacteria, fungi, virus, protozoa and algae.

Growth of microorganisms : Growth curve, effects of environment factors in growth of microorganisms –pH, water activity, oxygen availability, temperature and others.

Microorganisms involved in food fermentation and their role.

2. Microbiology of deficient food: Spoilage. Contamination sources, types, effect on the following:

a. Cereal and cereal products. **b.** Sugar and sugar products**. c.** Vegetables and fruits **d.** Meat and meat products. **e.** Fish, egg and poultry, Milk and milk products. **f.** Canned foods.

3. Environmental microbiology:

a. Water and water borne diseases. **b.** Air and air borne diseases. **c.** Soil and soil borne diseases. **d.** Sewage and diseases.

4. Beneficial effect of microorganisms.

5. Waste product handling:

a. planning for waste disposal. **b.** Solid wastes and liquid wastes.

6. Microbial intoxication and infections: Sources of contamination of food, toxin production and physiological action, sources of infection of food by pathogenic organisms, symptoms and method of control.

7. Control of microorganisms:

1. Physical and chemical methods used in sterilization and disinfection.
2. Uses of high and low temperature, dehydration, freezing, freeze drying, irradiation and use of preservatives.

8. Nutrition and culture of microorganisms:

1. Microbial nutrition-Types of culture media, Methods of pure culture and sub culture.
2. Bacterial growth-Extrinsic and intrinsic factors affecting growth.

9. Food contamination:

Primary sources of food contamination

10. Food infections:

1. Bacterial food infections-Salmonellosis, Shigellosis and Listeriosis.
2. Food poisoning (Staphylococcal & Botulism) - Symptoms, mode of transmission and methods of prevention, Concept of aflatoxin intoxication.
3. Relevance of microbial standards for food safety.

DSE1P: Practical **Credits 02**

1. Study of equipments in a microbiology lab.
2. Preparation of laboratory media and special media, liquid (broth) and solid media Slant and Stab.
3. Microbiological pure culture technique: Spread plate, Pour plate and Streak plate. Cultivation of yeasts and moulds.
4. Microbial Staining: Simple stain, Differential stain (Gram stain).
5. Cultivation and identifications of important molds and yeast in food items.
6. Demonstration of available rapid methods and diagnostic kits used in identification of microorganisms or their products.
7. Visits (at least two) to food processing units or any other organization dealing with advanced methods in food microbiology.

Suggested Readings:

1. Pelczar MJ, Chan ECS, and Krieg NR (2004). Microbiology. 5th edition Tata McGraw Hill.
2. Prazier WC and Westhoff DC (1988). 4th edition, Food Microbiology, MaGraw Hill Inc.
3. Prescott SC, Dunn CG (2009). Industrial Microbiology.
4. Roday S (1999). Food Hygiene and Sanitation, 1st Edition, Tata McGraw Hill, New Delhi.
5. Stanier RY, Ingraham JL, Wheelis ML, and Painter PR (2005). General Microbiology. 5th edition. McMillan.
6. Talaro K and Talaro A (2011). Foundations in Microbiology, 8th ed. McGraw-Hill
7. Tortora GJ, Funke BR, Case CL (2008). Microbiology. An Introduction. 9th ed. Benjamin/Cummings Publishing.

Or

DSE 1: Food Standards and Food Safety Guidelines Credits 06

DSE1T: Food Standards and Food Safety Guidelines Credits 04

Course Contents:

1. **Microorganisms and Sanitation:**

   - The relationship of microorganisms to sanitation. Effects of microorganisms on food degradation and food – borne illness.
   - Importance of personal hygiene of food handlers: Habits, cloths, illness, education of food handler in handling and serving food. Concepts of food contamination.

2. **Food additive and food safety:**

   • Concept of food safety, definition and factors affecting food safety.
   • Food additives-various types and their effects on health.

3. **Food processing** – Definition, types, enzyme of importance in food processing – Proteases, lipases, oxidoreductase and hydrolase.

4. **Food security:** Concept of food security**,** factors affecting food security.

5. **Food adjuncts and preserved products:**
   - Elementary idea on food preservation: principles and different methods – drying, freezing, frying, canning,etc.
   - Spices (Chilies, Turmeric, Garlic and Ginger), use and nutritional aspect.
   - Jams, Jellies, Squashes–uses and nutritional aspects.

6. **Food adulteration:**
   - Definition, Reasons and types.
   - PFA definition of food adulteration, Common adulterants in food and their effects on health.
   - Common household methods to detect adulterants in food,

7. Food laws and Regulatory authority:

- Food Laws, Consumerisms: Definition, consumer protection, Consumer education, Legal mode of protection, Machinery for redresal of consumer grievances.
- Prevention of Food Adulteration (PFA) Act.
- Regulating authority - Codex Alimentarius, ISI, Agmark, Fruit Products Order (FPO), Meat Products Order (MPO), Bureau of Indian Standards (BIS), Food Standards and Safety Authority of India (FSSAI).

DSE1P: Practical Credits 02

Detection of common adulterants in foods:

1. Detection of vanaspati in ghee/ butter.
2. Detection of khesari flour in besan.
3. Detection of argemone oil in edible oil.

4. Detection of metanil yellow in turmeric or colour sweet products.
5. Detection of dried papya seeds in black pepper.
6. Detection of artificially foreign matter in tea (dust/leaves).
7. Visit to food preservation centre/industry and demonstration of preparation and packaging of jam, jelly, chilli sauce, tomato ketchup, squash, pickles, etc.

Suggested readings:

1. Gopalan C and Kaur S (Eds.) (1993). Towards Better Nutrition, Problems and Policies, Nutrition Foundation of India.
2. Tovel AP (1984). Standardising Food Service for Quality and Efficiency. AVI Publishing Company INC.
3. Dept. of WCD, Govt. of India. (1993): National Nutrition Policy.
4. Food and Nutrition Board, Dept. of WCD, Govt. of India (1995): National Plan of Action on Nutrition.
5. Roday S (1999). Food Hygiene and Sanitation, 1st Edition, Tata McGraw Hill, New Delhi.
6. Diehl JF (1995). Safety of Irradiated Foods Marcel Dekker Inc, New York.
7. Raheena Begum: A textbook of food, nutrition and dietetics Sterling Publishers, New Delhi.
8. Joshi SA. Nutrition and Dietetics. Tata McGraw Hill, Publications, New Delhi.
9. Mahan LK and Escott-Stump S (2000). Krause's Food Nutrition and Diet Therapy, 10th edition, W.B. Saunders Ltd.

Or

DSE-1: Dietetics and Counseling — Credits 06

DSE1T: Dietetics and Counseling — Credits 04

Course Contents:

1. Practical consideration in giving dietary advice and counselling -
    a) Factors affecting and individual food choice.
    b) Communication of dietary advice
    c) Consideration of behaviour modification
    d) Motivation.
2. Counselling and educating patient
    a) Introduction to nutrition counselling
    b) Determining the role of nutrition counseller
    c) Responsibilities of the nutrition counseller
    d) Practitioner v/s client managed care
    e) Conceptualizing entrepreneur skills and behaviour
    f) Communication and negotiation skills.
3. Teaching aids used by dietitians- charts, leaflets, posters etc., preparation of teaching material for patients suffering from Digestive disorders, Hypertension, Diabetes, Atherosclerosis & Hepatitis and cirrhosis.

4. Computer application
    a) Use of computers by dietitian

b) Dietary computations
c) Dietetic management
d) Education/ training
e) Information storage
f) Administrations
g) Research

5. Computer application
   a) Execution of software packages
   b) Straight line, frequency table, bar diagram, pie chart, Preparation of dietary charts for patients
   c) Statistical computation- mean, median, standard deviation, conclusion and regression test.

DSE1P: Practical **Credit 02**

1. Project planning for any one disease.
2. Computer application for different diseases.
3. Submitting computed data.
4. Preparations of teaching aids in the field of nutrition.
5. Preparation of case history of a patient and feeding of information in the hard disc.

DSE-2: Community Nutrition and Epidemiology **Credits 06**

DSE-2P: Community Nutrition and Epidemiology **Credits 04**

Course Contents:

1. **Concept of population and Community:** Concept and characteristic features of population. Concepts and types of community. Concept of community nutrition. Factors affecting health of community – environmental, social, political, cultural and economical.

2. **Community water and waste management:** Source of water, safe drinking water, etiology and effects of toxic agents. Microbial examination of water, Water-Potability test (MPN Test). Sewage disposal and treatment.

3. **Nutritional problems in community:**
   a. Nutrition and health in National Development.
   b. Malnutrition – meaning, factors contributing to malnutrition, over nutrition.
   c. Nutritional disorders : Epidemiology, clinical features, prevention and dietary treatment for protein energy malnutrition, nutritional anaemias & vitamin deficiency disorders.
   d. Nutritional and infection relationship : Immunization and its importance, Food borne infection,and intoxication diseases, foods involved, methods of prevention, infestation of food borne diseases, outbreak, Prevention sign and control of infection.

4. **Community nutrition programme planning** – identification of problem, analysis of causes, resources constraints, selection of interventions, setting a strategy, implementations and evaluation of the programme.

5. Nutritional status assessments and Nutritional intervention programmes :

a. Nutritional status assessment: Meaning, need, objectives and importance.

Methods of assessing nutritional status:

i. Sampling techniques, identification of risk groups.
ii. Direct assesement – Diet surveys, Nutritional anthropometry – height, weight, BMI, MUAC, head and chest circumference, Diet survey by recall method, Clinical assessment, biochemical assessments.
iii. Indirect assesement – Food balance sheet, ecological parameters and vital statistics.

b. National and International agencies in uplifting the nutritional status:

- FAO,WHO, UNICEF, CARE, ICMR, ICDS, ICAR, CSIR, CFTRI ANP,VHAI,NIN.
- Role of voluntary health organization in the improvement of community health.

c. Nutritional intervention programmes :

Nutritional intervention programme to combat malnutrition. Concept of food fortification and food enrichment.

6. Nutrition Education :

Definition, objectives of nutrition education. Methods of imparting nutrition education.

7. Concept of Disease:

Endemic, Epidemic and Pandemic, Acute and Chronic. Communicable and Non-communicable diseases, Zoonosis, Epizootic and Enzootic.

8. Principles of Epidemiology:

Epidemiological study-Descriptive and Analytical. Rate of Disease in a Population-Attack rate, Mortality and Morbidity rate, Prevalence and Incidence of a disease, The incubation period, Quarantine period. Factors that Influence the Epidemiology of Disease.

DSE2P: Practical **Credits 02**

1. Preparation of homemade ORS.
2. Identification of vulnerable and risk groups,
3. Preparation of weaning foods for infants.
4. Preparation of low cost and medium cost school tiffin.
5. Use of anthropometric measurements in children.
6. Diet survey by 24 Hours recall methods.
7. Preparation of visual aids.
8. Field visit to : a) Observe the working of nutrition and health oriented programmes (survey based results), b) Hospitals to observe nutritional deficiencies.

9. Visit to old age home / ICDS Centre / Nutrition Rehabilitation Centre (NRC) / Slum area / any public place and Prepare a report on nutritional status and health concern (at least 10-15 case studies to be done).
10. Visit to a Rural Technology Centre/Community Welfare Centre and prepare a brief field report on Rural Technology and Community Development.

Suggested Readings:

1. Park K (2009). Park's Textbook of Preventive and Social Medicine, 20th Edition, M/s Banarasidas Bhanot, Jabalpur.
2. Gordis L (1996). Epidemiology, Saunders, Pennsylvania.
3. Norell SE (1998): Workbook of Epidemiology. Oxford: University Press, New York.
4. Owen AY and Frankle RT (1986). Nutrition in the Community, The Art of Delivering Services, 2nd Edition, Times Mirror/Mosby.
5. Roday, S. (1999) Food Hygiene and Sanitation. 1st Edition, Tata McGraw Hill, New Delhi.
6. Saha A, Shattock F, Mustafa T. Epidemology in Primary Health Care. The McGraw- Hill Companies.

Or

DSE-2: Personnel Management **Credits 06**

DSE2T: Personnel Management **Credits 04**

Course Contents:

1. Organization and management:
   a) Definition and types of organization.
   b) Definition- functions and tools of management.
   c) Technique of effective management and its application to food preparation and science.

2. Food material management:
   a) Meaning, definition, and importance.
   b) Food selection, purchasing, receiving and storeroom management.
   c) Control in relation to the above operations (material planning, budgeting, material identification, modification and standardization, inventory control, store keeping, definition, objectives, functions, factors underlying successful storekeeping, duties and responsibilities of a storekeeper, purchasing, organization, principle, procedure, systems and quality control).

3. Personnel Management: Recruitment, selection and training of personalities, work standards, productivity, supervision, performance appraisal and motivation incentives for effective performances.

4. Labour policies and legislation: (Personnel policies related to salaries, other emoluments, allowances, leave, uniform and other prize benefit, laws and organization)- Laws affecting food service institution to study the following: (hospital, flight kitchen, hotel, restaurant, canteen, Industrial) -

a. Organization
b. Physical plan and layout.
c. Food and silver equipment
d. Sanitation and hygiene.

DSE2P: Practical **Credits 02**

Visit and appraisal of any two medical organization.

1. Work simplification: food preparation, Calculating work unit, time norms etc.
2. Costing, accounting, budgeting, purchase.
3. Storekeeping: Listing and management of food items in the store.
4. Personnel recruitment: Preparations of a project and report making.
5. Maintenance of the clothing for persons and staff involved in kitchen area.
6. Prepare an inventory for evaluating staffs personal hygiene.

Or

DSE-2: Computer Application and Research Methodology Credit 06

DSE2T: Computer Application and Research Methodology Credit 04

Course Contents:

A. Computer

1. Computer fundamental – Basic anatomy of computer, generation of computer, application of computer.
2. Hardware and Software concept – Storage devices, system software, multi programming operating system, multi tasking operating system.
3. Computer viruses: Computer viruses, working of viruses, network viruses, antivirus, common antivirus software.
4. Data Processing – Types of data, types of data processing, step in data processing, application of data processing.
5. Principle of Programming – Programme language approaches.
6. Word Processing: Basic features of Text formatting; Creating documents; Heading Styles; Creating Reference Lists
7. Presentations: Creating Presentations; Pasting Charts etc in Presentations; Exporting Presentations as PDF

B. Research Methodology

1. General concept of research, types of research – Exp. Research, Action research, Historical research. Understanding the Nature of Research. Formulation of the Research Topic Approaches to Research and Research Strategy. Research Ethics.
2. Sampling – Criteria, Design, characteristics of good sampling, types of sampling. Sample Selection Methods

3. Data, data collection method, Criteria of good data, grouped data, ungrouped data. Using Secondary Data Using Primary Data – Collecting Data through Observations/ Interviews/ Questionnaire.
4. Experimental design –In brief.
5. Analysing Data. Writing Project Report - Referencing Styles. Review of Literature

DSE2P: Computer & Assignment Programme on Research Methodology Credit 02

1. Tabular form of data presentation in computer. File Creation and Management System. Word Processing.
2. Use of Microsoft Word and Excel with specific problem.
3. Assignment programme for Experimental design – covering any one of the following fields.
    i. Protein under nutrition and its recovery.
    ii. Vitamin or Mineral under nutrition and its recovery.
    iii. Dietary management of non-communicable disease.
    iv. Impact of nutrition education on awareness development in the field of personal health.

Suggested Readings:

1. Ranjit Kumar: Research Methodology - A Step by Step Guide for Beginners (Sage Publications, 4th Edn.)
2. Data Analysis using Microsoft Excel – Ash Narayan Sah, Excel Books India
3. Antia,F.P and Abraham,P Clinical Dietetics and Nutrition. Oxford University Press, New Delhi.
4. Joshi,SA. : Nutrition and Dietatics. Tata McGraw – Hill Publishing Co. Ltd., New Delhi.

SKILL ENHANCEMENT COURSE (SEC)

SEC- 1: Diet Therapy - I **Credits 02**

SEC1T: Diet Therapy - I **Credits 01**

Course Contents:

1. Definition of Dietetics, dietitian, goals of diet therapy.

2. **Basic concepts of Diet therapy:** Therapeutic adaptations of normal diet, Classification of therapeutic diets (Progressive diets – Normal, Soft, Clear fluid diet and Full fluid).

3. **Dietitians and hospital basic diets:**
- Types of dietitians and role of dietitian in a hospital. Routin hospital diets. Specially modified therapeutic diet.
- Nutritional adequacy of hospital diets, Basic concept and methods of (i) Oral feeding (ii) Tube feeding (iii) Parenteral feeding.

4. Etiology, symptoms, diagnostic tests and dietary management of Gastro-intestinal tract and liver diseases - Diarrhoea, Constipation, Irritable Bowel Syndrome, Peptic ulcer , Jaundice and Cirrhosis of liver.

5. Etiology, Risk factor, Sign and Symptom, Diagnosis and dietary management: Diabetes mellitus, Diabetes insipidus

6. Etiology, symptoms, diagnostic tests and dietary management of Malabsorption syndrome, Lactose intolerance, Food allergy

7. Anemia: definition, causes, classification and dietary management of nutritional anaemia.

8. Fever: Definition, causes, types, symptoms and dietary management.

SEC1P: Practical **Credits 01**

Planning and preparation of therapeutic diets for the following diseases: Diabetes melilitus (case specific), Hepatitis (case specific), gastrointestinal diseases (case specific), anemia (case specific).

Suggested Readings:

1. Anderson L, Dibble MV, Tukki PR, Mitchall HS, and Rynbergin HJ. Nutrition in Health and Disease. 17th edition, JB Lipincott & Co. Philadelphia.
2. Anita FP. Clinical Dietetics and Nutrition. Second Edition, Oxford University Press, Delhi.
3. Davis J and Sherer K (1994). Applied Nutrition and Diet Therapy for Nurses, 2nd Edition, WB Saunders Co.
4. Escott-Stump S (1998). Nutrition and Diagnosis Related Care, 4th Edition, Williams and Wilkinson
5. Garrow JS, James WPT and Ralph A (2000). Human Nutrition and Diabetics, 10th Edition, Churchill Livingstone.

SEC- 2: Diet Therapy – II **Credits 02**

SEC2T: Diet Therapy –II **Credit 01**

Course Contents:

1. Etiology, clinical features, dietary and general management of Weight Imbalances**:** Underweight, Overweight and Obesity.

2. Eating disorder: Concept of Anorexia nervosa and bulimia.

3. Etiology, Risk factor, Sign and Symptom, Diagnosis and dietary management of Hypertension, Renal diseases in special reference to Glomereulo -nephritis, Uremia, and Nephrosis.

4. Diseases of the cardio vascular system:
a. Brief review of lipoproteins (TC, TG, LDL, HDL, VLDL),
b. Atherosclerosis – etiology, risk factor and dietary management.

5. Etiology, Risk factor, Sign and Symptom, Diagnosis and dietary management of Cancer

SEC2P: Practical **Credit 01**

1. Planning and preparation of therapeutic diet for obesity (Case Specific),
2. Planning and preparation of therapeutic diet for Hyper tension (Case Specific),
3. Planning and preparation of therapeutic diet for Renal Diseases (Case Specific),

Suggested Readings:

1. Anderson L, Dibble MV, Tukki PR, Mitchall HS, and Rynbergin HJ.: Nutrition in Health and Disease. 17th edition, J.B. Lipincott & Co. Philadelphia.
2. Anita FP. Clinical Dietetics and Nutrition. 2nd Edition, Oxford University Press, Delhi.
3. Davis J and Sherer K (1994). Applied Nutrition and Diet Therapy for Nurses, 2nd Edition, W.B. Saunders Co.
4. Escott-Stump S (1998): Nutrition and Diagnosis Related Care, 4th Edition, Williams and Wilkinson.
5. Garrow JS, James WPT and Ralph A (2000). Human Nutrition and Diabetics, 10th Edition, Churchill Livingstone.
6. Srilakshmi B (2016). Dietetics. New Age International.

SEC 3: Basic Molecular Biology and Immunology **Credits 02**

SEC3T: Basic Molecular Biology and Immunology **Credit 02**

Course Contents:

Molecular Biology

1. Nucleic acid: Bases, nucleosides and nucleotides.
2. DNA structure: DNA double helix (Watson and Crick Model). Types of DNA and RNA, DNA and RNA as genetic material.
4. DNA replication: Semi-conservative replication, Basic mechanism of replication (Prokaryotes / Eukaryotes).
5. Transcriptional unit and basic concept of transcription (Prokaryotes / Eukaryotes).
6. Genetic code and basic mechanism of translation (Prokaryotes / Eukaryotes).
7. Basic concept of genomics, proteomics and metabolomics.

Immunology:

1. Introduction: Basic concept of immunity, Types of immunity-innate, acquired, active and passive immunity.
2. Humoral immune system: Mechanisms of humoral immunity, Immunoglobulin isotypes - IgG, IgM, IgA, IgD, and IgE.
3. Cell mediated immune system: Types of effector T cells, mechanisms of cell mediated immunity.

Suggested Readings:

1. Bolandar, M. (2001). Molecular Endocrinology. Elsevier Science.
2. Alberts, B. et al. (2008). Molecular Biology of the Cell. 5th Ed. Garland Publishing House.
3. Yoshinori Mine (Editor), Kazuo Miyashita (Editor), Fereidoon Shahidi (Editor): Nutrigenomics and Proteomics in Health and Disease: Food Factors and Gene Interactions.
4. Van Ommen, B. (2004). Nutrigenomics: Exploiting systems biology in the nutrition and health arenas. Nutrition.20:4-8.
5. Simopoulos, A.P. and Ordovas, J.M. (Editors)(2004). Nutrigenetics and Nutrigenomics.
6. Roche, H.M. (2004). Dietary lipids and gene expression. Biochem Soc Trans. 32(Pt 6):999-1002.
7. Mount, D. W. Bioinformatics. Sequence and Genome Analysis, CSHL Press.
8. Jones.N. C., Pevzner, P. A. (2004). An Introduction to Bioinformatics Algorithms, MPI Press.
9. Kaput J, Rodriguez RL. (2004)Nutritional genomics: The next frontier in the postgenomic era. Physiol Genomics.16:166-177.
10. Kaput J. and Rodriguez. R. L. (2006). Nutritional Genomics. John Wiley & Sons, Inc.
11. DeBusk RM, Fogarty CP, Ordovas JM, Kornman KS. (2005). Nutritional genomics in practice: Where do we begin? *J Am Diet Assoc*. 105:589-598.

Or

SEC- 3: Toxicology and Public Health **Credit 02**

SEC3T: Toxicology and Public Health **Credit 01**

Course Contents:

1. Toxic agents: Human exposure, Xenobiotics- Definition, types. Mechanism of action and resultant toxicities of the following xenobiotics: Metals: Lead, arsenic, Pesticides: Organophosphates, carbamates, organochlorine.

2. Eco-toxicology: Basic concepts, significances. Brief introduction to avian and aquatic toxicology. Movement and effect of toxic compounds in food chain (DDT, mercury). Bioaccumulation: Concept & significance. Biomagnification : Concepts and Significance. Concept of BOD and COD.

3. Concepts of health and community health. Factors affecting community health.

4. Maternal and Child mortality: Definition and causes. Role of health workers in the improvement of maternal and child health.

5. Immunization: Importance and immunization schedule for children and adults.

6. General idea about the contamination of food (chemical and microbial) – Sources and transmission, elementary ideas about food toxins,aflatoxins & food toxicology with reference to lead, cadmium & zinc.

7. Contamination of water and prevention of contaminations of diarrhea, dysentery,typhoid, hepatitis,preventive measures and dietary management of such diseases.

SEC3P: Practical **Credit 01**

1. Calculation of BMI of an individual and interpretation of results.
2. Growth charts – Plotting of growth charts for growth monitoring.
3. Formulation and demonstration of nutrition education tools such as charts, posters, and models related to health and nutrition education.

Suggested Reading:

1. Immunology, 8th edition, (2012), Male, D., Brostoff, J., Roth, D.B. and Roitt, I., Elseivier-Saunders.
2. An Introduction to Immunology, Immunochemistry and Immunobiology, 5th edition, (1988), Barrett, James T., Mosby Company, St. Louis..
3. Immunology: An Introduction, 4th edition, (1994), Tizard, I.R., Saunders College Publishing, Philadelphia.
4. Cassarett and Doull's Toxicology "The Basic Science of The Poisons" 7th edition (2008).
5. Cassarett and Doull's "Essentials of Toxicology" 2nd edition (2010), Klaassen and Whatkins, McGraw Hill Publisher.

6. Introduction to Toxicology, 3rd edition (2001), John Timbrell, Taylor and Francis Publishers.
7. Principles of Toxicology, 2nd edition (2006), Stine Karen and Thomas M Brown, CRC press.
8. Lu's basic toxicology: Fundamentals target organ and risk assessment, 5th edition (2009), Frank C Lu and Sam Kacow, Informa Health care.

SEC - 4: Biostatistics and Bioinformatics **Credits 02**

SEC4T: Biostatistics and Bioinformatics

Course Contents:

Biostatistics

Introduction to Biostatistics: Variable and attribute; population vs sample; Census vs sample survey; Data and Data type. Primary and Secondary data. Arrangement of data; Frequency distribution. Graphical Representation of Data: Line diagram, Bar diagram, Pie Chart, Histogram.

Measures of Central Tendency.Arithmetic mean, Mode, Median.

Dispersion-Range,Variance, Standard deviation, Standard error of mean, standard score.

Testing Hypothesis and Goodness of fit- Null hypothesis, Level of significance, Probability, Normal distribution, Error of inference, Student's t-test, Paired t-test, Fisher's t-test, Chi-square test.Analysis of Variance(ANOVA)

Bioinformatics :

Introduction to bioinformatics : Computer Fundamentals – Programming languages in bioinformatics, Role of Super computer in biology. Historical background. Scope of bioinformatics – Genomics, Proteomics and Computer aided Drug Design (Structure based and ligand based approaches). Application of Bioinformatics. Bioinformatics and Health Informatics: Concept and applications.

Biological databases and data retrieval: Introduction to biological databases – Primary, secondary and composite databases, NCBI, nucleic acid databases (GenBank, EMBL,DDBJ,NDB), Protein databases (PIR, Swiss- Prot, TrEMBL, PDB). Nutrient data bases.

Suggested readings

1. Saxena Sanjay (2003) A First Course in Computers, Vikas Publishing House.
2. Pradeep and Sinha Preeti (2007) Foundations of Computing, 4th ed., BPB Publications.
3. Lesk M.A. (2008) Introduction to Bioinformatics. Oxford Publication, 3rd International Student Edition.
4. Rastogi S.C., Mendiratta N. and Rastogi P. (2007) Bioinformatics: methods and applications, genomics, proteomics and drug discovery, 2nd ed. Prentice Hall India Publication.
5. Primrose and Twyman (2003) Principles of Genome Analysis & Genomics. Blackwell.
6. Debjyoti Das (2012). Biostatistics.

7. E. Batschelet : Introduction to Mathematics for Life Scientists,Springer Verlag, International Student Edition, Narosa Publishing House, New Delhi (1971, 1975).
8. W. Danial : Biostatistics : A foundation for Analysis in Health Sciences, John Wiley and Sons Inc; 2004.
9. A Edmondson and D. Druce : Advanced Biology Statistics, Oxford University Press; 1996.

Or

SEC4T: Nutrition and Fitness **Credits 02**

SEC4T: Nutrition and Fitness

Course Contents

1. Body composition, concept of fat free mass, lean body mass and related measurements.
2. Understanding Fitness: Definition of fitness, health and related terms. Assessment of fitness, Approaches for keeping fit.
3. Importance and benefits of physical activity: Physical Activity – frequency, intensity, time and type with examples Physical Activity, physical activity guidelines and physical activity pyramid.
4. Importance of nutrition Role of nutrition in fitness, Nutritional guidelines for health and fitness, Nutritional supplements.
5. Importance of diet and exercise for weight management.
6. Fitness in athletics and sports.
7. Role of nutrients on sports performance.
8. Doping and related hazards.

Suggested Readings:

1. Campbell BI. (2014). Sports Nutrition: Enhancing Athletic Performance, CRC Press, Taylor& Francis,
2. Haff GG. (2008). Essentials of Sports Nutrition Study Guide, Humana Press.
3. Dunford M and Doyle JA. (2008). Nutrition for Sport and Exercise, Thomson Wadsworth.
4. Srilakshmi B. (2018). Dietetics, New Delhi: New Age International.

Or

SEC-4: Women Health & Nutrition **Credits 02**

SEC4T: Women Health & Nutrition

Course Contents

1. Factors (non-nutritional) affecting pregnancy outcome, importance of adequate weight gain during pregnancy, antenatal care and its schedule, Nutritional requirements during pregnancy and modification of existing diet and supplementation, Deficiency of nutrients,

specially energy, iron folic acid, protein, calcium, iodine. Common problems of pregnancy and their managements, specially - nausea, vomiting, pica, food aversions, pregnancy induced hypertension, obesity, diabetes. Adolescent pregnancy.

2. Nutritional requirements during lactation, dietary management, food supplements, galactogogues, preparation for lactation. Care and preparation of nipples during breast feeding.

Suggested Readings:

1. Ghosh, S: The Feeding and Care of Infants arid Young Children, VHAI. 6th Ed. Delhi.
2. WHO: A growth chart for International use In Maternal and Children Health Care, Geneva.
3. Mann and Truswell: Essentials of Human Nitration, Oxford University press.
4. Indian Council of Medical Research: Nutrient Requirements and Recommended- Dietary Allowance for Indians, New Delhi.