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Semester-V

FYBDN 501 Nutrition & Life Cycle: 3credits,

Course Objectives:

1. To impart basic knowledge about the nutrition, energy, growth and development
2. To manage nutrition during Pregnancy, Lactation, Infancy, Children etc.
3. To learn nutritional management skills for human beings.

Course Outcomes (COs):

Sl. No.	Course Outcome (CO)
1	Make use of basic knowledge about nutrition.
2	Test for the nutritional requirements.
3	Explain energy in human nutrition.
4	Develop knowledge of growth and development
5	Understand, remember, and apply the knowledge and skills required for monitoring the growth

Unit I **8hrs**

Nutrition during Pregnancy and lactation:

a) Physiological stages of pregnancy b) Effect of Nutritional status on Pregnancy outcome c) Nutritional Requirements d) Guide for eating during pregnancy) Complications of pregnancy and their dietary Implications. Lactation: Physiology b) Nutritional Requirements, breast feeding an infant.

Unit II **8hrs**

A. **Nutrition during Infancy**: a) Physiologic Development b) Nutritional Requirements c) Milk for Infants-Composition of human and cow's milk, formulas d) **Complementary foods-**weaning pattern, composition, general principles in feeding infants, special feeding problems Nutritional requirements of Toddlers (1-3years).

B. Nutrition in the Care of the Low-Birth weight Infant:

C. Characteristics of low-birth weight Infant, small for date babies, pre-term babies Use of growth chart.

Unit III: **8hrs**

Nutrition of Preschool and School going children a) Growth and Development b) Nutritional Requirements c) Factors influencing food intake d) Nutritional Concerns

Unit IV **8hrs**

Nutrition in Adolescence: a) Growth and Development-Physiologic changes b) Nutritional Requirements c) Situations with special needs.

Unit V **8hrs**

Nutrition in adults of different activity levels and income groups.

FYBDN 591 Nutrition & Life Cycle (Practical)

2 credits, Total-20hours + 20 self-paced practice hours

1. Preparation of Complementary Feeds for Infants-weaning foods (Cost Specific)
2. Planning and preparation of a day's diet for a school going child with special emphasis on Packed Lunches.
3. Planning and preparation of a day's diet for an adolescent girl/boy.

Planning and preparation of a day's diet for an adult man/woman (sedentary/moderate/ heavyworker)

4. Planning a day's diet for Pregnant Woman

Reference Book:

1. Antia, F.P. (2005): Clinical Nutrition and Dietetics, Oxford University Press, Delhi Gordon M Ward law (1999) Perspectives in Nutrition 4thed.WCB/McGraw Hill. International edition.
2. Mahan, L.K., Arlin, M.T. (2000): Krause's Food, NutritionandDiettherapy,11thedition, W.B.Saunders Company, London.
3. Passmore, R and Davidson S (1986) Human Nutrition and Dietetics. Living stone Publishers.
4. Robinson, C.H; Lawler, M.R. Chenoweth,W.L;and Garwick,A.E(1986):Normal and Therapeutic Nutrition,17th Ed., MacMillanPublishing Co
5. Shil's M E, Alfon J A, Shike M (1994) Modern Nutrition In health and Diseases 8th ed. Shubhangini A Joshi (2002): Nutrition and Dietetics 2nd edition, Tata Mc Graw-Hill Publishing Company Limited, New Delhi.
6. Srilakshmi,B.(2005):Dietetics,5th edition, New Age International(P) Limited Publishers, New Delhi
7. Williams's (1989): Nutrition and diet Therapy.6th edition. Times Mirror/Mosby College Publishing, St.Louis

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FYBDN 502: Diet Therapy I:3 credits,
Total-30 hours + 15 Tutorial hours

Course Objectives:

1. To learn about diet therapy for different common diseases.
2. To learn diet management for common diseases.

Sl. No.	Course Outcome (CO)
1	Apply the basic concepts of diet therapy.
2	Make use of concept of the Team approach to health care.
3	Demonstrate the concept of the Routine Hospital Diets.
4	Compare the concept of the Diets for different febrile conditions.
5	Infer the concept of the Etiological factors, symptoms, and Management
6	Illustrate, apply, and assess the knowledge and skills required for implementation of dietary management forthe diseases of the liver and biliary system as well as cardiovascular diseases.

Unit I **2hrs**

A. Basic Concepts of Diet Therapy

Nutrition Care Process: Definition of MNT, Nutritional Assessment (ABCD), Nutritional Diagnosis, Nutrition Intervention, Monitoring & Evaluation of Nutritional Care.

B. Modifications of the Normal Diet 2hrs

General or Regular, Adequate or House Diet, Soft Diet, Liquid Diets- Clear Liquid Diet, Full Liquid Diet,Mode of

Feeding- Enteral or Oral Route- Enteral (via) tube feeding Parenteral – Peripheral Vein Feeding, Total Parenteral Nutrition (TPN)

Unit II **5hrs**

A. Nutrition during Febrile Disorders:

a) Classification of fevers b) Metabolism c) General Dietary Considerations

d) Acute & chronic fevers -Typhoid, Tuberculosis, Malaria

B Nutrition for Weight Management **5hrs**

Assessment of obesity – BMI, Waist Hip-Ratios, Skin folds Thickness

Etiology – Genetic Factors, Physiological Factors, Behavioral factors Metabolism in obesity – Basal Metabolism, Treatment – Dietary Management, Fad diets and their consequences, Underweight – Etiology,Health hazards, Treatments.

Unit III

Nutrition in Gastrointestinal Disorders **5hrs**

Peptic Ulcer Disease – Etiology, Symptoms, Dietary Management

Intestinal Diseases – irritable bowel syndrome (IBS), Constipation, Diarrhea

Diseases of the Small Intestine – Celiac Disease – Gluten Sensitive Enteropathy, Tropical Sprue, Lactose Intolerance

Inflammatory Bowel Disease - Crohn's Disease, Ulcerative Colitis

C. Nutrition in Diseases of the Liver **5hrs**

Hepatitis: Types, Etiology, Symptoms, Treatment Cirrhosis: Etiology, Clinical Symptoms, Treatment, Hepatic Encephalopathy: Etiology, Clinical Symptoms, Treatment Diseases of the Gallbladder:(brief) Cholecystitis and Cholelithiasis

D. Nutrition in Cardiovascular Disorders 6hrs

Atherosclerosis – Introduction, Etiology, Multiple Risk Factors, Treatment, Diet and FeedingPattern, Food to be avoided and included.

Acute Cardiovascular Disease – MI – Dietary Management Chronic Coronary Heart Disease – CHF –Dietary Management.
Hypertension – Classification, Risk Factors, Symptoms, Dietary Management

FYBDN 592 Diet Therapy I
2 credits, Total-20hours

1. Modification of diet according to consistency
2. Planning and preparation of diets for diarrhea & constipation
3. Planning and preparation of diets for febrile conditions - Typhoid, Tuberculosis and Malaria
4. Planning and preparation of diets for obese and underweight patients
5. Planning and preparation of diet for Peptic Ulcer patients

Planning and preparation of diet for viral hepatitis and cirrhosis of liver
Planning and preparation of diet for hypercholesterolemia

6. Planning and preparation of diet for hypertensive patients

Reference

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

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Semester-VI

FYBDN 601 Diet Therapy II

3 credits, Total- 30hours + 15 Tutorial Hours

Course Objectives:

1. To know the nutritional energy calculation, and energy management.
2. To know the different lifestyle diseases, corresponding diet, and dietary management.

Sl. No.	Course Outcome (CO)
1	Demonstrate and apply the knowledge and skills required for Energy modifications and nutritionalcare for diabetes management.
2	Examine and apply the knowledge and skills required for planning and preparation of diet in kidneydiseases.
3	Infer and apply the knowledge and skills required for planning and preparation of diet for foodallergy, food intolerance, surgical conditions, and metabolic disorders.
4	Conclude the knowledge and skills required for preparation of diet plan for cancer.

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Unit I Nutrition in Diabetes Mellitus 5hrs
Prevalence, Classification, Factors Influencing, Risk Factors – Clinical Characteristics,Metabolic changes in Diabetes
Diagnosis of Diabetes Mellitus (1) Blood Glucose Levels, a) Glycosuria, b) Ketonuria (2) Oral Glucose Tolerance Test (3) Glycosylated Hemoglobin HbA1C Management - Principles ofNutritional Therapy-I (i) Care of Insulin Dependent Diabetes Mellitus
(ii) Insulin Therapy
iii) Testing Methods for Monitoring Results-
a) SBGM b) HbA1C c) Urine TestingII Care of Non-Insulin Dependent Diabetes

III Complications of Diabetes-Hypoglycemia, DKA, Fasting Hyperglycemia LongTerm Complications-Macro vascular and Micro Vascular Diseases

Unit II Nutrition in Renal Diseases: 5hrs
Renal Function in Disease, Etiology, Clinical Symptoms and Course of Disease, Treatment – DietaryManagement, Feeding Pattern, Glomerulonephritis, Nephrotic Syndrome - Kidney disease, Kidney Dialysis

Unit III Nutrition in Surgical Conditions 5hrs

a)Surgical Conditions – General Considerations, Pre-Operative and Postoperative Diet

b)Major Burns – Medical Management – (i) Fluid & Electrolyte Repletion (ii) Wound Management

c)Trauma – Hormonal Response, Levels of Stress

Infections-UTI and HIV

Unit IV Food Allergy and Food Intolerance 5hrs
Definitions, Symptoms, Risk Factors, Food Intolerances, Diagnosis, Food Challenge,Treatment

Unit V Metabolic Disorders 5hrs
Gout-etiology, Symptoms, & nutritional management

Unit VI Cancer 5hrs

Nutritional care in Cancer- Pathophysiology, Causes, Types, Nutritional management

FYBDN 691 Diet Therapy II-Practical
2 credits, Total-20 hours + 20 self-paced practice hours

1. Planning and preparation of diets for type I diabetes
2. Planning and preparation of diets for type II diabetes
3. Planning and preparation of diet for food intolerance
4. Planning and preparation of diets for kidney disease
5. Planning and preparation of diets for gout
6. Planning and preparation of diets for cancer

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FYBDN 602 Food Safety and Quality control
3credits, Total-30hours + 15 Tutorial hours

Course Objectives:

1. To acquaint on Food quality control, Food Laws, regulations for the safety of Foods.

2. To gather knowledge on Food additives, adulterants, and their effect on human health.

Sl. No.	Course Outcome (CO)
1	Make use of the concept of food additives and their effect on human health.
2	Experiment with the concept of the common adulterants in food and their effects on health.
3	Experiment with the concept of the spoilage of different food infections and infestation
4	Evaluate the applications of basic techniques required for implementing the food laws, and their regulations.

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UNIT-I **6hrs**

Principles of Quality control of foods –Raw material control, processed food control (meat, fish and milk products) and finished product inspection. Leavening agents- classification, uses and optimum levels. Food additives according to FSSAI guidelines - Preservatives, coloring, flavoring, sequestering agents, emulsifiers, antioxidants.

UNIT-II **6hrs**

Standardization systems for quality control of foods: -National and International standardization system, GMP,GHP. Different types of food grade materials.
Food adulteration - Common adulterants in foods and tests to detect common adulterants.

UNIT-III **6hrs**

Standards for foods: Cereals and pulses, milk and milk products, Coffee, tea, sugar and sugar products.

UNIT-IV **6hrs**

Methods for determining quality - Subjective and objective methods. Sensory assessment of food quality (cereals and milk products) -appearance, color, flavor, texture and taste, different methods ofsensory analysis, preparation of score card, panel criteria, sensory evaluation room.

UNIT-V **6hrs**

Food safety, Risks and hazards: Food related hazards, Microbial consideration in food safety, HACCP-principles and structured approach.

Reference Books:

1. Food science-Norman Potter
2. Food Technology-Presscott.S.C.and Procter
3. Food chemistry-Meyer
4. Food science,Chemistry and experimental foods-M.Swaminathan
5. Food chemistry-Lee
6. Food science-Srilakshmi(2001)2nd edition, New age international publishers-(2001)
7. Rufus.K.Guthrie-Food sanitation –3rd edition –Van NostrandReinhold New York1988.
8. Mahindra-S.N.-Food safety –A techno-legal analysis-Tata McGrawhillpublishers2000.
9. Manoranjan Kalia-Food processing and preservation.
10. RodayFood hygiene andsanitation.
11. Indian Food Industry,2000, Vol 19:2

FYBDN 692 Food Safety and Quality Control : 2 credits,
Total-20hours + 20 self-paced practice hours

1. Market survey of preserved fruits and vegetable products.
2. Visit a food testing lab or any agency of food standards.
3. Nutrition labeling requirements and developments.
4. Simple tests for food adulteration.
5. Case study on food safety issues – ICDS/MDM, Diarrheal our break /any other.

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FYBDN 603 Sports Nutrition
4 Credits, Total:40hours + 20 Tutorial hours

Course Objectives:

1 To work with the objectives, importance and principles of sports nutrition.

2. To use the steps and methods involved in planning nutritional guidelines for different sports activities.

3. To utilize the knowledge about Pre- event meal and diets for athletes.

Sl. No.	**Course Outcomes (COs)**
1	Appraise the sports nutrition
2	Make use of the concept of the benefits of physical activity and exercise
3	Construct concept regarding the classification of Sports activities
4	Evalute the concept regarding nutritional requirements of sports person
5	Apply basic techniques required for planning of diet during and after events for athletes.

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Unit I: 8hrs

Definition of physical activity, exercise, physical fitness, sports physiology and sports nutrition.

Unit II: 8hrs

Benefits of physical activity and exercise. walking (recreational) fitness or gym, running, swimming, cycling, walking, football or soccer, yoga.

Unit III: 8hrs

Classification of Sports activities.

Unit IV: 8hrs

Nutritional requirements of sports person. Carbohydrate, Protein and fat nutrition for sports.

Unit V: 8hrs

Pre- event meal. Designing diets for athletes.

Recommended Readings:

a. Campbell B (2017): Sports Nutrition: Enhancing Athletic Performance, CRC Press, Taylor & Francis.
b. Haff GG (2008): Essentials of Sports Nutrition Study Guide, Humana Press.
c. Dunford M and Doyle JA(2008):Nutrition for Sport and Exercise, Thomson Wadsworth,
d. Brouns F (2002): Essentials of Sports Nutrition, 2nd Revised Ed. Wiley-Blackwell.
e. Bean A (2017): The Complete Guide to Sports Nutrition, 8th Ed. Bloomsbury Sport.
f. Benardot D (2011): Advanced Sports Nutrition, 2nd Ed. Human Kinetics Publishers.
g. Srilakshmi B (2014): Dietetics, 7th Multicolour Ed. New Age International (P) Ltd

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Semester VII

FYBDN 701 Nutritional management and diet counselling

4 credits, Total-40 hours d+ 20 Tutorial hours

Course Objectives:

1. To become aware of the fact that diet plays an important role in the treatment of the disease.
2. To educate the patient regarding the nature of the disease, its hazards, how a disease can be recognized and prevented. It is essential to advice the patient on personal hygiene, individual instructions on diet and any specific therapy needed.

Sl. No.	Course Outcomes (COs):
1	Appraise the term Dietician in real life context
2	Develop the concept of dietician in hospital and community
3	Evaluate the concept of nutritional diagnosis, assessment, and care process.
4	Examine the concept of nutrition vs. medical diagnosis, Nutrition Interventions
5	Conclude the Monitoring & Evaluation of the Nutritional aspects

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Unit I: **2hrs**

Introduction to term Dietician: Definition of Dietician, Difference between registered dietician & Nutritionist.

Unit II: **2hrs**

Role of Dietician: Role of dietician in hospital, work area of hospital dietician, role of dietician in hospital, interpersonal relationship with patient,

Unit III: **4hrs**

Role of dietician in community: Function and working area of community dietician.

Unit IV: **6hrs**

Definition of nutritional care, planning and implementary dietary care, Team approach to nutritional care. Steps of Nutrition Care Process.

Unit V: **4hrs**

Nutrition Assessment: Definition, Nutrition assessment component, Critical thinking.

Unit VI: **5hrs**

Nutrition Diagnosis: nutrition diagnosis domain: intake, clinical, behavioral – environmental.

Unit VII: **5hrs**

Nutrition diagnosis, component nutrition vs. medical diagnosis

Unit VIII: **6hrs**

Nutrition Interventions: Definition and objectives

Unit IX: **6hrs**

Nutrition Monitoring & Evaluation: Definition, Nutrition monitoring & evaluation components, nutrition goals & objectives. Evaluation of nutrition care.

Reference Books:

1. Mahan LK and Escott-Stump S(2007): Krause's Food and Nutrition Therapy. 12th Ed. WB Saunders Company, London.

2. Robinson. CH, Lawler MR, Chenoweth WL and Garwick, AE(1986): Normal and Therapeutic Nutrition. 17th Ed.,Macmilian Publishing Co.

3. Williams SR (1989): Nutrition & Diet Therapy, 6th Ed. Times Mirror/Mosby College Publishing, St. Louis.

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FYBDN 702 Research Methodology I

5 credits, Total- 50 hours + 10 Tutorial hours

Student will be able to -

1. Impart knowledge of scientific method, purpose and approaches to different research
2. To understand the significance of research methods in food and nutrition
3. Study the comparison and contrast quantitative and qualitative research
4. Demonstrate different research design and the research cycle
5. Gather knowledge on ethical principles, issues and procedures
6. To appreciate the importance of scientific writing and develop competence
7. in writing skills.
8. To draft a research proposal and write a scientific paper.

Unit I 6hrs

- Introduction to Research Methodology
- Application of Research Methodology
- Types of research, qualitative & quantitative

Unit 2 6hrs

- Definition & Identification of Research Problem
- Selection of research problem
- Jusstification
- Theory
- Hypothesis
- Basic assumption
- Limitation & delimitation of the problems

- Types of variables

Unit 3 6hrs

- Elements of Research Design

  Exploratory, descriptive & causal research.

- Research Strategies
- Data Collection
- Methods Of Data Collection

Unit 4 6hrs

Sampling

- Simple Random Systematic, Random Sampling
- Two stages & multistage sampling
- Non-probability sampling : purpose
- Quota & Volunteer Sampling/Screwball sampling

Unit 5 7hrs

- Qualitative research in food and nutrition
- Type of quality of research
- Tools
- Techniques and methodology
- Rapid assessment procedure

- Project reorientation and
- evaluation

Unit 6. Quantitative research method 7hrs

- Theory and design in quantitative research
- Definition and quantitative research
- Methods and techniques of data collection
- Group discussion
- Interviews: key information, in depth interview
- Critical analysis of research
- Writing a research proposal
- Analysis of data and research

Unit 7 6hrs

- Write a research report / frame a research report

Unit 8 6hrs

- Ethics of research

RECOMMENDED READINGS

- Best, JW and Kahn, JV (1992) Research in Education.6th ed. New Delhi, Prentice Hall of India Pvt. Ltd,.
- Kothari, CR (2004) Research Methodology, Methods & Techniques, 2nd ed. New Age International Publishers.
- Goode, WJ and Hatt, PK (1981) Methods in Social Research, McGraw Hill International Editions, Sociology Series.
- Kerlinger, FN (1983) Foundations of Educational Research. 2nd ed.
- Marjory L. Joseph, William D Joseph (1996) Research Fundamentals in Home Economics / Human Ecology. Plycon Press.
- WHO (2001) Health Research Methodology – A Guide for Training in Research Methods.
- Stennberg, R J (1991) The Psychologist's Companion : A Guide to Scientific Writing for students and Researchers. Cambridge: CUP.
- Scrimhshaw NS and Gleason GR: Rapid Assessment Procedures, Qualitative Methodologies for Planning and Evaluation of Health Related Programmes. International Nutrition Foundation for Developing Countries, Boston.
- Cresswell J : Research Design : Qualitative and quantitative Approaches Thousand Oaks CA, Sage Publications.

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FYBDN 703 Geriatric Nutrition

3 credits

Course Objectives:
1. To know the Geriatric nutrition and its management.
2. To know and understand the nutritional requirements of the elderly.

Course Outcome (CO)
1 Make use of the concept of gerontology, geriatrics, and geriatric nutrition.
2 Demonstrate the concept of the Physiological and biochemical changes during old age.
3 Examine and explain the concept of the nutritional status of older adults.
4. Construct and apply the knowledge and skills required for preparation of dietary guidelines for elderly people according to their nutritional requirements.
5 Evaluate the concept of the major nutritional and health problems during old age.

Unit I: 8 hrs

Introduction to ageing. Definition of ageing, senescence, old age or aged people, gerontology, geriatrics, and Geriatric nutrition. Classification of the old population.

Unit II: 9hrs
Metabolic syndrome, Physiological and biochemical changes during old age. Implication of ageing population for rehabilitation: Demography, mortality and morbidity.

Unit III: 9hrs
Assessment of nutritional status of older adults. Weight disorders, Obesity, Underweight and malnutrition.
Unit IV: 12hrs
Nutritional requirements and general dietary guidelines for elderly, Presenting oral health exam for the elderly.

Unit V: 12hrs
Major nutritional and health problems during old age. Dementia and Parkinson's disease: physiology, diagnosis, therapy, nutrition dementia, artificial feeding and bedsores, osteoporosis.

Reference Books:
1. Human Nutrition by H. Guthrie and M.F. Piccianom, WCB McGrawHill,1995.
2. Robinson CH, Lawler MR, Chenoweth WL, GarwickAE(1991): Normal And Therapeutic Nutrition, 17th Ed, MacMillan Publishing Company, New York,
3. Insel PM, Turner RE and RossD (2004): Nutrition ,Jones & Bartlett Learning,
4. Morley JE and Thomas DR(2007): Geriatric Nutrition, 1st Ed. CRC Press.
5. Watson RR (2008):Handbook of Nutrition in the Aged, 4th Ed. CRC Press.
6. Chernoff R(2013):Geriatric Nutrition : The Health Professional's Handbook, 4th Revised Ed. Jones and Bartlett Publishers.

FYBDN 793 Geriatric Nutrition (Practical)
2 credits, Total-20 hours + 20 self-paced practice hours

1. Assessment of Nutritional Status of elderly population by using Mini Nutritional Assessment Tool (Free living/old age home)
2. Assessment of Functional Status of elderly population by using Barthel Index Tool (Free living/old age home)
3. Assessment of Depression Status of elderly population by using Geriatric Depression Scale (Free living/old age home)
4. Assessment of Cognitive Function of elderly population by using MMSE Tool (Free living/old age home)

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Semester VIII

FYBDN 801 Research Methodology II

5 credits, Total- 50 hours + 10 Tutorial hours

Course objectives:

1. To familiarize students with the basic concepts of statistics in the healthcare field.
2. To develop an understanding of data and its processing
3. To align the minds of the students to the application of software in data analysis

Sl. No.	Course Outcomes (COs)
1.	Make use of the concept of Statistics including primary data, secondary data etc
2	Demonstrate about various concept of probability
3	Experiment with sampling method, ANOVA
4	Assess and apply the knowledge and skills required for data analysis using correlation, regression
5	Make use of basic techniques required for R programming

Unit 1: **8hrs**

Types of Data, Collection of data; Primary & Secondary data, Classification and Graphical representation of Statistical data. Measures of central tendency and Dispersion. Measures of Skewness and Kurtosis.

Unit 2: **8hrs**

Probability classical & axiomatic definition of probability, Theorems on total and compound probability), Elementary ideas of Binomial, Poisson and Normal distributions.

Unit 3: **8hrs**

Methods of sampling, confidence level, critical region, testing of hypothesis and standard error, large sample test and small sample test. Problems on test of significance, t-test, chi- squaretest for goodness of fit and analysis of variance (ANOVA).

Unit 4: **12hrs**

Correlation and Regression. Emphasis on examples from Biological Sciences. Basic introduction to Multivariate statistics. Curve fitting.

Unit 5: **12hrs**

R Programming.

Reference Books:

1. Agresti, A. & Franklin C.A. (2009) Statistics: The Art and Science of Learning from Data (Second Edition) Boston,MA: Pearson Prentice Hall, ISBN 978-0-13-513199-2
2. Bernard, H.R. (2000). Social Research Methods: Qualitative and Quantitative Approaches. Thousand Oaks, CA: Sage. Black, J.A. and Champion, D.J. (1976).

3. Methods and Issues in Social Research. New York: John Wiley and Sons. Blaxter, L., Hughes, C, and Tight, K. (1999).
4. How to Research. New Delhi: Viva books. Diez, D. M., Barr, C. D., Cetinkaya-Rundel M. (2015). OpenIntro Statistics:((Third Edition). CreateSpace Independent Publishing Platform. ISBN-10: 194345003X, ISBN- 13: 978- 1943450039 http://www.openintro.org/stat/ textbook.php.
5. Elmes, D.G., Kanowitz, B.H. and Roediger, H.L. (1989). Research Methods in Psychology (Third Edition). New York: West Publishing Company. Fowler, F.J. (1988).
6. Survey Research Methods. Applied Social Research Methods Series, Vol. 1. Newbury Park, CA: Sage. Greene, S. and Hogan, D. (Eds.). (2005).
7. Researching Children's Experiences: Methods and Approaches. London: Sage. Gordis L. (2013)

FYBDN 802 Functional Food & Nutraceuticals

Credits (5) Total Hours : 50 hours + 10 Tutorial hours

Course Objectives :

1. To introduce them to various functional food groups and food products
2. To understand the category of nutraceuticals based on sources, chemical function and mechanism of action.
3. To enable students understand the relation between Functional Foods, Nutraceuticals and Food and Drugs.
4. To make them aware of the National & International regulatory aspects of functional food.

UNIT– I INTRODUCTION TO FUNCTIONAL FOODS & NUTRACEUTICALS (9 Hours)

Functional foods and Nutraceuticals – Definition and history, Classification Designer foods and pharma foods.

Teleology – definition, primary and secondary metabolites.

Organisational Models for Nutraceuticals - a) Food Sources b) Mechanism of Action c) Chemical Nature

Consumer Marketing - Factors for marketing functional foods and nutraceuticals

UNIT -II Categorization of Nutraceuticals (9 Hours)

Classification based on food source, mechanical actiona, chemical nature , isoprenoids , phenolic subsatnces , fatty acids and structural lipids, terpenoids – saponins, topotrienols and simple terpenes , carbohydrate derivatives , amino acid derivatives and isoflavons.

UNIT III – Probiotics , Prebiotics & Synbiotics (7 Hours)

General Functions of Intestinal Microflora

Prebiotics - Definition, role of prebiotic as functional ingredient, examples.

Probiotics - Definition, role of prebiotic as functional ingredient, examples.

Synbiotics - Definition, functions, examples.

UNIT IV – Functional Nature of Nutraceuticals (9 Hours)

Polyphenols – Flavonoids, Catechins, Isoflavones, Tannins , Phytoestrogens, Phytosterols , Glucosinolates, Organosulphur Compunds, Proteins and peptides, Conjugated linoleic acids.

Bioactive Compounds : Saponins, Haemagglutinins, Reservatrol, Kaempferol , Quercetin , Cinnamaldehyde , Capsaicin, Piperine , Gingerol , Eugenol, Apigenine, Thymoquinone .

UNIT –V HERBS AND FLOWERS AS FUNCTIONAL FOODS (9 Hours)

Action of Herbs and Efficacy on:

a) Nervous System-Ginseng, St.John’s wort, Ginkgo biloba, Bacopa

Monnieri & Centalla asiatica

b) Heart and Circulatory System-Hawthorn plant

c) Immune System -Echinacea

d) Digestive System-Ginger valerian root fennel

e) Respiratory System-Licorice root, kava kava

f) Urinary System-Cranberry, Saw palmetto

g) Musculoskeletal System-Fever few

Flowers

Medicinal values, nutritional importance, culinary uses, effect of cooking of

Edible flowers – Drumstick, Neem, Agathi, Plantain

Ornamental edible flowers – Hibiscus, lotus, rose

Unit VI Regulatory aspects of functional food & Nutraceuticals (7Hours)

Regulatory Aspects : International & National regulatory aspects of functional foods in India, ICMR guidelines for probiotics , Advances in research in functional foods. Regulatory prospectives of FOSHU foods.

Reference Books :

Chatwick. R. (2003), Functional Foods Springer.

2. David H Watson (2001), Performance Functional Foods, Culinary and

Hospitality Industry Publications.

3. Israel Goldberg (2001), Functional Foods Designer Foods Pharma

Food,Nutraceuticals ,Culinary and Hospitality Industry Publications.

4. Mary K Schmidl and Theodore P.Labuza, (2000), Essentials of Functional

Foods, Culinary and Hospitality Industry Publications Services.

5. Mazza G. (1998), Functonal Foods Biochemical Processing Aspects,

Culinary and Hospitality Industry Publications.

6. Robert E C Wildman (2001), Handbook of Nutraceuticals and Functional

Foods ,Culinary and Hospitality Industry Publications.

Maulana Abul Kalam Azad University of Technology, West Bengal
(Formerly known as West Bengal University of Technology)
Syllabus of B.Sc. (Dietetics and Nutrition)
Effective from academic session 2023-2024

Elective Subjects

FYBDN 801A Nutrigenomics
5 credits, Total-50 hours + 10 Tutorial hours

Course Overview

1. Gain knowledge about nutrigenomics.

2. Understanding the molecular level interaction between nutrients and other dietary bioactive with human genome.

3. Know the applications of Nutrigenomics in wellness and disease management.

Learning Objectives

SL. No.	Course outcome
1	To learn the concept of nutrigenomics and nutrigenetics.
2	Articulate and advocate the principle of nutrigenomics in controlling life style diseases.

UNIT 1: 9hrs
Molecular Biology- Structure and functions of Nucleic Acids: structure of different The DNA Double Helix, Different DNA Structures, DNA in the Cell, RNA Structure, The organization of DNA in chromosome

UNIT 2: 9hrs

DNA Replication and Repair: Unit of replication, enzymes involved, fidelity of replication, DNA damage and repair mechanisms.

RNA synthesis and processing: Structure and function of RNA polymerases. Transcription factors and machinery, formation of initiation complex, transcription activators and repressors, RNA processing, editing, and splicing. Structure and functions of different types of RNA, RNA transport.

Translation and Transport1: Translation machinery; ribosomes; composition and assembly; universal genetic code; degeneracy of codons; termination codons; isoaccepting tRNA; Wobble hypothesis; mechanism of initiation, elongation and termination; Co- and post-translational modifications; genetic code in mitochondria; transport of proteins and molecular chaperones; protein stability; protein turnover and degradation.

UNIT 3: 9hrs

Introduction to Gene-diet interactions: Nutrigenomics: Scope and Importance to Human Health and Industry. Transporter gene polymorphisms -interaction with effects of micronutrients in humans. Polymorphisms in genes affecting the uptake and transport of omega-6 and omega-3 polyunsaturated fatty acids: interactions with dietary lipids and chronic disease risk. Nutrigenomics approaches to unravelling physiological effects of complex foods. The intestinal microbiota - role in nutrigenomics.

UNIT 4: 9hrs

Nutrigenomics & Nutrigenetics in Disease: Modulating the risk of following diseases through Nutrigenomics: • cardiovascular disease • Diabetes • Obesity • Cancer • Ageing •Dementia

UNIT 5: 9hrs

Technologies in nutrigenomics:

Genomics techniques: Different sequencing approaches, Microarray, SNP genotyping, PCR and RT-PCR techniques

Proteomics Techniques:1-D, 2-D gel electrophoresis, Differential gel electrophoresis (DIGE), novel peptide identification, peptide sequencing methods

Metabolomics techniques: Chromatography and mass spectrometry techniques, Discovery and validation of biomarkers for important diseases and disorders

UNIT 6: 5hrs

Educating the public about nutritional genomics: Is direct-to-consumer testing the future of this field? collaboration with medical experts to introduce nutrigenomics to the general public; Is modern society prepared for nutrigenomic research? The importance of nutrigenomics and nutrigenetics for public health

Reference Books

1. QI L. Gene-Diet Interactions in Complex Disease: Current Findings and Relevance for Public Health, Curr Nutr Rep 2012: 1: 222-227.
2. 2. TUCKER K. L., SMITH C. E., LAI C. Q., ORDOVAS J. M. Quantifying diet for nutrigenomic studies, Annual review of nutrition 2013: 33: 349-371.
3. 3. PETERS L. L., ROBLEDO R. F., BULT C. J., CHURCHILL G. A., PAIGEN B. J., SVENSON K. L. The mouse as a model for human biology: a resource guide for complex trait analysis, Nature reviews Genetics 2007: 8: 58-69.
4. 4. FRAZER K. A., MURRAY S. S., SCHORK N. J., TOPOL E. J. Human genetic variation and its contribution to complex traits, Nature reviews Genetics 2009: 10: 241-251.
5. DAVID L. A., MAURICE C. F., CARMODY R. N., GOOTENBERG D. B., BUTTON J. E., WOLFE B. E. et al. Diet rapidly and reproducibly alters the human gut microbiome, Nature 2013.
6. KUCZYNSKI J., LAUBER C. L., WALTERS W. A., PARFREY L. W., CLEMENTE J. C., GEVERS D. et al. Experimental and analytical tools for studying the human microbiome, Nature reviews Genetics 2012: 13: 47-58.

7. PERRY G. H., DOMINY N. J., CLAW K. G., LEE A. S., FIEGLER H., REDON R. et al. Diet and the evolution of human amylase gene copy number variation, Nat Genet 2007: 39: 1256-1260.

8. LUCA F., PERRY G. H., DI RIENZO A. Evolutionary adaptations to dietary changes, Annual review of nutrition 2010: 30: 291-314.

9. LEDDA M., KUTALIK Z., SOUZA DESTITO M. C., SOUZA M. M., CIRILLO C. A., ZAMBONI A. et al. GWAS of human bitter taste perception identifies new loci and reveals additional complexity of bitter taste genetics, Hum Mol Genet 2014: 23: 259-267.

10. TEPPER B. J. Nutritional implications of genetic taste variation: the role of PROP sensitivity and other taste phenotypes, Annual review of nutrition 2008: 28: 367-388.

11. FRAYLING T. M., TIMPSON N. J., WEEDON M. N., ZEGGINI E., FREATHY R. M., LINDGREN C. M. et al. A common variant in the FTO gene is associated with body mass index and predisposes to childhood and adult obesity, Science 2007: 316: 889-894.

12. ZHANG X., QI Q., ZHANG C., SMITH S. R., HU F. B., SACKS F. M. et al. FTO genotype and 2-year change in body composition and fat distribution in response to weight-loss diets: the POUNDS LOST Trial, Diabetes 2012: 61: 3005-3011.

13. TANAKA T., NGWA J. S., VAN ROOIJ F. J., ZILLIKENS M. C., WOJCZYNSKI M. K., FRAZIER-WOOD A. C. et al. Genome-wide meta-analysis of observational studies shows common genetic variants associated with macronutrient intake, Am J Clin Nutr 2013: 97: 1395-1402.

14. CHU A. Y., WORKALEMAHU T., PAYNTER N. P., ROSE L. M., GIULIANINI F., TANAKA T. et al. Novel locus including FGF21 is associated with dietary macronutrient intake, Hum Mol Genet 2013: 22: 1895-1902.

15. DO R., XIE C., ZHANG X., MANNISTO S., HARALD K., ISLAM S. et al. The effect of chromosome 9p21 variants on cardiovascular disease may be modified by dietary intake: evidence from a case/control and a prospective study, PLoS medicine 2011: 8: e1001106.

16. CORNELIS M. C., EL-SOHEMY A., KABAGAMBE E. K., CAMPOS H. Coffee, CYP1A2 genotype, and risk of myocardial infarction, Jama 2006: 295: 1135-1141.

17. MADDEN J., WILLIAMS C. M., CALDER P. C., LIETZ G., MILES E. A., CORDELL H. et al. The impact of common gene variants on the response of biomarkers of cardiovascular disease (CVD) risk to increased fish oil fatty acids intakes, Annual review of nutrition 2011: 31: 203-234.

18. GARCIA-CALZON S., MARTINEZ-GONZALEZ M. A., RAZQUIN C., CORELLA D., SALAS-SALVADO J., MARTINEZ J. A. et al. The Pro12Ala Polymorphism of the PPARgamma2 Gene Interacts with a NUTR/GNET 865: Nutrigenomics: Understanding gene x diet interactions Syllabus 2015 4 Mediterranean Diet to Prevent Telomere Shortening in the PREDIMED-NAVARRA Randomized Trial, Circ Cardiovasc Genet 2014.

19. DOLINOY D. C., WEIDMAN J. R., WATERLAND R. A., JIRTLE R. L. Maternal genistein alters coat color and protects Avy mouse offspring from obesity by modifying the fetal epigenome, Environmental health perspectives 2006: 114: 567-572.

20. JIRTLE R. L., SKINNER M. K. Environmental epigenomics and disease susceptibility, Nature reviews Genetics 2007: 8: 253-262.

21. NG S. F., LIN R. C., LAYBUTT D. R., BARRES R., OWENS J. A., MORRIS M. J. Chronic high-fat diet in fathers programs beta-cell dysfunction in female rat offspring, Nature 2010: 467: 963-966.

22. DONOHOE D. R., BULTMAN S. J. Metaboloepigenetics: interrelationships between energy metabolism and epigenetic control of gene expression, Journal of cellular physiology 2012: 227: 3169-3177.

23. COONEY C. A., DAVE A. A., WOLFF G. L. Maternal methyl supplements in mice affect epigenetic variation and DNA methylation of offspring, J Nutr 2002: 132: 2393S-2400S.

FYBDN 801B : Medical Nutrition Therapy

Total Credit:5, Total Hours: 50hours + 10 Tutorial hours

Course Overview

On successful completion of this course, students will able to:

1. Identify and infer accurate nutrition information and be able to better interpret nutrition information.

2. Evaluate the basis for dietary standards & guidelines

3. Demonstrate a knowledge of medical terminology and medical abbreviations associated with nutrition related diseases and conditions.

4. Examine nutrient & drug interactions

5. Compare medical nutrition therapy for various disease states including critical care patients

Unit 1: 6hours

Introduction to Medical Nutrition Therapy: Definitions and Role of Dietitians in Health Care, The Nutritional Care Process (NCP), Patient Screening, Assessment, Care and counselling.

Modifications of the Normal Diet: General or Regular, Soft Diet, Liquid Diets- Clear Liquid Diet, Full Liquid Diet,Mode of Feeding- Enteral or Oral Route- Enteral (via) tube feeding Parenteral – Peripheral Vein Feeding,Total Parenteral Nutrition (TPN)

Unit 2: 7hours

Nutritional Anaemia: Erythropoiesis and haemoglobin synthesis, nutrients involved in Erythropoiesis. Classifications of Anaemias- Normocytic anaemia – aplastic anaemia, Megaloblastic anaemia, Microcytic anaemia, Sickle cell anaemia and Thalassemia, Haemolytic anaemia and Nutritional Care.

Unit 3: 4hours

Food Allergies: Definition, Symptoms and mechanism of food Allergy Diagnosis – Biochemical, immune testing (brief), history and food record, Elimination diets, Food Selection. Food allergy in infancy (milk sensitive enteropathy, colic prevention of food allergy)

Unit 4: 5hours

Nutrition in Pulmonary Disease: Effects of Malnutrition on Respiration, Chronic Obstructive Pulmonary Disease, Etiology and Pathogenesis, Respiratory Failure and Nutritional Care.

Unit 5: 20hours

Nutritional Care in Hyper metabolic Conditions: Cancer, Burns, Sepsis and Surgery.

Unit 6: 8hours

Drug-Nutrient & Nutrient-Nutrient Interactions: Effects of diet and nutritional status on drug absorption, Drug induced maldigestion and malabsorption. Effects of drugs on vitamin and mineral status, diseased state and risk of drug-nutrient and drug- nutritional status interactions & Nutrient-Nutrient Interactions.

Reference

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

FYBDN 801 C

Credits 5, Total- 50 hours + 10 Tutorial hours

NUTRITION COMMUNICATION AND ITS APPLICATION

Course Overview

- Apply the national and international dietary guidelines addressing nutrition and health aspects.
- Examine the determinants of food behaviour.
- Plan, implement and evaluate behaviour change communication for promotion of nutrition and health among the vulnerable groups.
- Utilize the concept of nutrition advocacy, and Develop skills in preparation of communication strategies and communication aids for nutrition / health promotion of the community.
- Plan, implement and evaluate nutrition education programme for the community.
- Evaluate plans and proposals for public health nutrition

programme.
- Implement and evaluate an action plan for a public health nutrition programme in the community.

Unit I 10 hrs

Dietary guidelines for nutrition and health related concerns
National / international guidelines and their role in nutrition promotion. Critical appraisal of the current guidelines.

Unit II Nutrition and Behaviour Inter-relationship 10 hours

Food and health behaviour, models/theories of health behaviour, food choice, strategies for intervention at the ecological and individual level

Unit III Behaviour Change in Communication for nutrition and health promotion 20 hrs
- Concept and objectives of communication for behaviour change
- Planning of communication strategies for behaviour change programme

Communication needs analysis, stakeholders in nutrition promotion, developing nutrition education plan, identifying communication strategies and approaches for nutrition and health promotion (e.g. social marketing), designing nutrition and health messages, selecting communication channels, developing and field testing of communication materials, designing training strategy for trainers and building capacity.
- Implementing behaviour change communication intervention: overview
- Evaluation of communication for behaviour change programmes
- Ethics in nutrition and health communication

Unit IV Nutrition Advocacy – 10 hrs

Role in policy formulation and execution.
Theory of advocacy, Advocacy vs Behaviour Change Communication, analysis of the policy environment, preparation of policy briefs, monitoring and evaluation of policy related activities and outcomes.

RECOMMENDED READING

- Gibney M.J., Margetts, B.M., Kearney, J.M., Arab, L. (Eds) (2004) *Public Health Nutrition*.NS Blackwell Publishing.
- Prochaska, K.L., *The Transtheoretical Model of Behavioural Change*, Shumaker SA(Eds).
- Public Health Communication: Evidence for Behavior Change by Robert C. Hornik © 2002 by Lawrence Erlbaum Associates, Inc.
- Communication and Health: Systems and Applications. Edited by Eileen Berlin Ray and Lewis Donohew © 1990 by Lawrence Erlbaum Associates, Inc.
- Designing health messages: Approaches from Communication Theory and Public Health Practice. Editors: Edward Maibach and Roxanne Louiselle Parrott © 1995 by Sage Publications, Inc.
- Community Nutrition in Action: An Entrepreneurial Approach. Fourth Edition. Marie A. Boyle and David H. Holben. © 2006 Thomson Wadsworth.

Suryapadas (2018) Textbook of community nutrition. Academic publishers.

Note: Evaluation rubric for Capstone/Research project shall be duly notified in advance