

Maulana Abul Kalam Azad University of Technology, West Bengal
(Formerly West Bengal University of Technology)
Syllabus for B. Sc. (Dietetics and Nutrition)
(Applicable from the academic session 2022-2023)
Choice Based Credit System (140 Credits)

CBCS – MAKAUT UG degree (Hons) 140 Credit FRAMEWORK

Subject Type	Semester I	Semester II	Semester III	Semester IV	Semester V	Semester VI
CC	C1, C2	C3, C4	C5,C6,C7	C8,C9,C10	C11,C12	C13,C14
DSE					DSE1, DSE2	DSE3, DSE4
GE	GE1	GE2	GE3	GE4		
AECC	AECC 1	AECC 2				
SEC			SEC 1	SEC 2		
	4 (20)	5 (20)	4 (26)	5(26)	4 (24)	4 (24)

B.Sc (Dietetics & Nutrition) Hons.

Program Outcomes or Graduate Attributes of B.Sc Program under MAKAUT :

Graduates will be able to demonstrate the following program outcomes:

PO1- Knowledge in Dietetics and Nutrition: Apply the knowledge of dietetics and nutrition in the practical field.

PO2- Design/Development of Solutions: Identify, formulate, review the dietary solutions on various health problems with appropriate consideration of nutritional requirements.

PO3- Dietetics & Nutrition Professional and Society: Create, select and apply techniques, resources and modern tools and techniques to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional field.

PO4- Individual and team work: Apply ethical principles and commit to professional ethics and responsibilities and norms as an individual, and as a member or leader in diverse teams and in multidisciplinary settings.

PO5- Communication: Communicate effectively on various activities and with the community at large, such as being able to counsel people of various age groups on health and write effective reports and design documentation, make effective presentations.

PO6- Lifelong Learning: Recognize the need and have the preparation and ability to engage in independent and life-long learning in the field of food and health industry.

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1st Semester

Category	Course Code	Credits	Course Name	Credit Distribution			Mode of Delivery			Proposed Moocs
				L	T	P	Off line #	On line	Blended	
CC 1	BDN(T)101	6	Basics of Nutrition	4	0	0	√			As per MAKAUT notification
	BDN 191			0	0	2				
CC 2	BDN(T) 102	6	Microbiology of Food	4	0	0	√			
	BDN 192			0	0	2				
GE 1		6	Students have to select from the GE Basket						√	
AECC 1	BDN 104	2	English Communication	2	0	0	√			
Semester credits		20								

2nd Semester

Category	Course Code	Credits	Course Name	Credit Distribution			Mode of Delivery			Proposed Moocs
				L	T	P	Off line #	Online	Blended	
CC 3	BDN(T)201	6	Basic Chemistry	4	0	0	√			As per MAKAUT notification
	BDN 291			0	0	2				
CC 4	BDN(T) 202	6	Food Science	4	0	0	√			
	BDN 292			0	0	2				
GE 2		6	Students have to select from the GE Basket	5	1	0			√	
AECC 2	BDN 204	2	Environmental Science	2	0	0	√			

3rd Semester

Category	Course Code	Credits	Course Name	Credit Distribution			Mode of Delivery			Proposed Moocs
				L	T	P	Offline	Online	Blended	
CC5	BDN(T)301	6	Human Physiology- I	4	0	0	√			As per MAKAUT notification
	BDN 391			0	0	2				
CC6	BDN(T) 302	6	Biochemistry-I	4	0	0	√			
	BDN 392			0	0	2				
CC7	BDN(T) 303	6	Public Health Nutrition	4	0	0	√			
	BDN 393									

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				0	0	2				
GE 3		6	Students have to select from the GE Basket						√	
SEC 1	BDN 304	2	Sports Nutrition	2	0	0	√			
Semester credits		26								

4th Semester

Category	Course Code	Credits	Course Name	Credit Distribution			Mode of Delivery			Proposed Moocs
				L	T	P	Offline	Online	Blended	
CC8	BDN(T)401	6	Nutrition & Life Cycle	4	0	0	√			As per MAKAUT notification
	BDN 491			0	0	2				
CC9	BDN(T) 402	6	Diet Therapy I	4	0	0	√			
	BDN 492			0	0	2				
CC10	BDN(T) 403	6	Human Physiology-II	4	0	0	√			
	BDN 493			0	0	2				
GE 4		6	Students have to select from the GE Basket						√	
SEC 2	BDN 404	2	Public Health	2	0	0	√			
Semester credits		26								

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5th Semester

Category	Course Code	Credits	Course Name	Credit Distribution			Mode of Delivery			Proposed Moocs	
				L	T	P	Offline	Online	Blended		
CC 11	BDN(T)501	6	Diet Therapy II	4	0	0	√			As per MAKAUT notification	
	BDN 591			0	0	2					
CC 12	BDN(T) 502	6	Biochemistry II	4	0	0	√				As per MAKAUT notification
	BDN 592			0	0	2					
DSE 1	BDN 581	6	Internship I (Any one discipline a)Food Industry, b)Health Industry, c)Community)	0	1	5	√			As per MAKAUT notification	
DSE 2 (Any One)	BDN 504A	6	Basic of Biostatistics	5	1	0	√				
	BDN 504B	6	Food fermentation	5	1	0					
Semester Credits		24									

6th Semester

Category	Course Code	Credits	Course Name	Credit Distribution			Mode of Delivery			Proposed Moocs	
				L	T	P	Offline	Online	Blended		
CC 13	BDN(T)601	6	Food Safety and Quality control	4	0	0	√			As per MAKAUT notification	
	BDN 691			0	0	2					
CC 14	BDN(T) 602	6	Geriatric Nutrition	4	0	0	√				As per MAKAUT notification
	BDN 692			0	0	2					
DSE 3 (Any One)	BDN 603A	6	Nutritional management and diet counseling	5	1	0			√	As per MAKAUT notification	
	BDN 603B	6	Introduction to Business Management	5	1	0					
DSE 4	BDN 681	6	Internship -II (Any one discipline a)Food Industry, b)Health Industry, c)Community)	0	1	5	√				As per MAKAUT notification
Semester Credits		24									

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Semester-I

BDN(T)101 BASICS OF NUTRITION

4 Credit, Total-48 hours

Course Objectives:

1. Basic knowledge about nutrition, energy, growth and development.
2. Basic knowledge regarding macro- and micro-nutrients and their role in nutrition

Sl. No.	Course Outcome (CO)
1	Remember and understand the concept of nutrition.
2	Idea of the energy in human nutrition.
3	Develop the knowledge of macro- and micro-nutrients and their role in nutrition
4	Develop the knowledge and skill for determining the nutritional requirement of an individual
5	Develop knowledge regarding vitamins and minerals and its role in nutrition
6	Remember and understand the concept of Functional foods

UNIT I:

Definition of food, nutrition, health, Nutraceuticals and Nutrigenomics. Dimension of health and function of food- Physical, social and mental health. Food guide – Basic food groups, my plate

UNIT II:

Energy requirements:

Factors affecting energy requirements,
BMR - activity, age, climate, diet induced thermogenesis (SDA), Physiological conditions.
RDA (ICMR) - formation, uses

UNIT III: Macronutrients

Protein, Carbohydrate, Fat-Classification, functions, Digestion & absorption (in brief), RDA, sources and deficiencies.

UNIT IV: Micronutrients

Macro-minerals

Calcium, Phosphorus and magnesium: Functions, absorption, RDA, sources and deficiencies.

Micro Minerals:

Sodium, Potassium, Iron, Zinc, Fluorine and Iodine, Copper, Selenium: function, absorption, RDA, sources and deficiency.

Vitamins

Fat-soluble Vitamins (A, D, E & K)

Function, RDA, sources and deficiency and excess.

Water soluble vitamins: Thiamin, Riboflavin, Niacin, B6, B12, Folic acid, Biotin and Vitamin C: functions, RDA, food sources, deficiencies and excess.

UNIT V: Water and Electrolytes.

Water: Functions, requirements, sources, water balance

Electrolyte and acid base balance: Electrolyte- Sodium, Chloride, Potassium sources and RDA, function

UNIT VI: Functional foods

Phytonutrients: Phytates, Tannins and Polyphenols, their sources and functions.

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BDN 191 BASICS OF NUTRITION PRACTICAL

2 Credits, Total-28 hours

1. Weights and measures.
2. Standardization of recipes.
3. Introduction to Recommended Dietary Allowances/Nutritive value of foods.
4. Calculation of energy balance among college going girls.
5. Enhancing the traditional recipes with specific nutrients (protein, carbohydrate, fat, vitamin A, vitamin C, calcium and iron).
6. Visit to the analytical lab for demonstration of protein and fat estimation.

References:

1. Antia F.P., Philip Abraham, Clinical Dietetics and Nutrition, Oxford University Press; 4th edition.
2. Srilakshmi, B.(2019):Dietetics,8th edition, New Age International(P) Limited Publishers, New Delhi
3. Kathleen Mahan L., Sylvania Escott-Stump, Krause's food, nutrition and diet therapy (11th edition). Saunders company, London.
4. Passmore R. and Davidson S. (1986) Human nutrition and Dietetics. Liming stone publishers.
5. Robinson C.H. Careme, Chenometh W.L., Garmick A.E. (1986) 16th edition Normal Therapeutic nutrient. Publish by Mc Millan Company New York.
6. Shil's M.E., Alfon J.A., Shike M (1994), Modern nutrition in health and diseases eighth edition.
7. William S.R., Nutrition and Diet Therapy fourth edition C.V. Mos Company.

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BDN(T) 102 Microbiology of Food

4 credits, Total-48 hours

Course Objectives:

1. Familiarize students with the general characteristics and growth characteristics of microbes.
2. Broad understanding of spoilage microorganisms and their effects on food and to get an idea about beneficial organisms.
3. Basic knowledge about the microbes present in the environment and handling of waste disposal.

Sl. No.	Course Outcome (CO)
1	Remember and understand the concept regarding the different types and morphology of microorganisms and magnification capacity of different types of microscopes.
2	Remember and understand the concept regarding the factors affecting the growth in controlling the growth curve of microorganisms.
3	Remember and apply the level of skill required to preserve the perishable foods from different types of microbial spoilage.
4	Remember and apply the level of skill required to preserve the non-perishable foods from microbial contamination and spoilage.
5	Explore the beneficial effects of microorganisms in the processing and development of fermented foods.
6	Know the different types and morphology of microorganisms and magnification capacity of different types of microscopes.

UNIT I:

Introduction to Microbiology-A. Scope of Microbiology, Food Microbiology its origins - historical Roots-(brief), Germ theory of Disease, B. Naming, Classification and identification, morphological characteristics of Bacteria (Salmonella typhi and Salmonella paratyphi, Clostridium perfringens and Clostridium botulinum, Escherichia coli, Campylobacter, Listeria monocytogenes, Staphylococcus aureus) Fungi (Alternaria, Aspergillus, Candida, Fusarium, and Saccharomyces, mucoromycetes) and viruses (Norovirus, Rotavirus, hepatitis A,E, Adenovirus, Astrovirus) Yeast (baker's yeast)

UNIT II:

Growth and Culturing of Bacteria-Growth and cell Division, Factors affecting Bacterial Growth-(Physical factors and nutritional factors),Culturing bacteria- (Methods of obtaining pure cultures, culture media, maintaining cultures).

UNIT III:

Factors affecting the growth of microorganisms-temperature, water activity, pH, oxygen and redox, interaction of factors and between organisms. Death of microorganisms and microbial populations- A . Heat, preservation of foods (appertization, pasteurization). B. Chemical agents-factors influencing activity of sanitizers, preservatives, hurdle effect, C. Radiation-preservation, D. High pressure (brief) Definition of FSSAI, HACCP-A Food Safety Assurance system (importance of quality control of food from microbial aspect)

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UNIT IV:

Food Spoilage- Nature, Causes, Contamination, Composition of spoilage, Changes in foods caused by spoilage organisms, Influence of processing, Spoilage of important food commodities and food products -Meat, Fish, Egg and Milk, Fruits and Vegetables, Cereals

UNIT V:

Food –borne disease and food poisoning: cause of disease, investigations and origins of food poisoning outbreaks, importance of food poisoning to individual and economy, control, Food poisoning bacteria causing:

1. Infections- *Salmonella*, *Shigella*, *E.coli*, *Vibrio cholerae*, *Campylobacter Jejuni*, *Clostridium Prefringens*,
2. Intoxications-*Staphylococcus aureus*, *Streptococcus aureus*, *Clostridium Botulinum*, *Bacillus Cereus*,
3. Viruses-Hepatitis A, B, C

References

1. Joshua. A.K. Microbiology - India printing works, Madras -1971.
2. Carpenter, Microbiology - W.B. Saunders Co., London.
3. Salie. A.J. Fundamental principles of Bacteriology - MCGraw Hill Book Co.,
4. R.C.Rubey & D.K. Maheshwari; A Textbook of Microbiology
5. Pelczar J. Michael; Microbiology concepts and Application
6. Ananthanarayan. R. & Paniker C.K.J; Textbook of Microbiology.
7. Frazier.W.C; Food Microbiology-McGraw Hill Book and Co; New York.
8. Smith and Water; Introductory food services-McGraw Hill Book and Co., New york,1971.
9. West Wood and Harger; Food Service in Institutions, 1966. John Wiley and Sons. Incorporation, New York, London.
10. ADAMS M.R. and MOSS M.O; Food microbiology, the Royal society and chemistry. Cambridge 1991.
11. Banwart. G.J; Basic food microbiology, Chapman and Hall, NewYork. HOBBS BC and Roberts. D;
12. Food poisoning and food Hygiene. Edward Arnold (A division of Hodder and Stoughton), London.
13. Sarda Mommore; HACCP, A practical Approach, Edn.1997.
14. Frezier and Westhoff, 5th Edition Food Microbiology, McGraw Hill Education, 2017

BDN 192 Microbiology of Food Practical

2 credits, Total-28 hours

1. Use of equipment- microscope, autoclave, hot air oven, incubator.
2. Preparation of slides- bacterial smears, simple staining, differential staining, staining of yeast and molds.
3. Morphological identification of important yeast and mold in foods (slides and culture)- rhizopus, mucor, aspergillus, penicillium, fusarium, cladosporium, alternaria.
4. Preparation of common laboratory media for cultivation of bacteria, yeast and molds. Use of readily available media for cultivation.
5. Isolation of microorganisms by pour plate method (dilution) spread plate and streak plate method.
6. Demonstration of microbiological analysis of water for enumeration of standard plate count and coliform count.

Reference Books:

1. Benson Harold.J. (1990) Microbiological Applications Wn.C. Brown Publishers, U.S.A.. Frazier, W.C. and Westhoff D.C (1988) fourth edition Food microbiology, Mc Graw Hill Inc.
2. Jay James.M. (1986) third edition, Modern food microbiology, Van Nostrand Reinhold Company Inc.
3. Pelczar, Chan, Krieg, Microbiology, fifth edition Tata Mc. Graw Hill (1993). Jay JM, Loessner MJ, and Golden DA (2005)
4. Jacquelyn G Black Microbiology principles and Explorations John Wiley and Sons, Inc (2008)
5. Microbiology Prescott Harle Klen 4th ed, Mc.Graw Hill Essentials of Food microbiology John Garbutt
6. College microbiology S.Sundara Rajan.
7. Microbiology Schaums Outlines I E ALCAMO Tata Mc Graw –Hill Publishing Company Ltd New Delhi

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Course: English Communication
Code : BDN 104
Credit: 2

Course Objective: The course is designed to develop the student's communicative competence in English by giving adequate exposure in the four communication skills - LSRW - listening, speaking, reading and writing and the related sub- skills, thereby, enabling the student to apply the acquired communicative proficiency in social and professional contexts.

Sl	Course Outcome	Mapped modules
1	Students will be able to Remember & Understand the basic concepts of the usage of English grammar & vocabulary in communication.	M1
2	Students will be able to Comprehend facts and ideas by organizing, comparing, translating, interpreting, giving descriptions, and stating the main ideas given in written texts.	M1,M2
3	Students will be able to Synthesise and Apply acquired linguistic knowledge in producing various types of written texts	M1, M3
4	Students will be able to Comprehend facts and ideas from aural inputs and Synthesise and Apply acquired linguistic knowledge in giving spoken response	M1, M4

Module Number	Content	Total Hours	%age of questions	Blooms Level (if applicable)	Remarks (If any)
M 1	Functional Grammar & Vocabulary	2	10	1,2	
M 2	Reading Skills	2	20	1,2	
M 3	Writing Skills	8	40	2,3,4	
M 4	Listening & Speaking Skills	8	30	2,3,4	
		20	100		

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Module 1 : Functional Grammar & Vocabulary : Tense: Formation and application; Affirmative / Negative / Interrogative formation; Modals and their usage; Conditional sentences; Direct and indirect speech; Active and passive voice; usage of common phrasal verbs, synonyms & antonyms. 1L + 1T

Module 2 : Reading Skills: Comprehension passages; reading and understanding articles from technical writing. Interpreting texts: analytic texts, descriptive texts, discursive texts; SQ3R reading strategy. 1L + 1T

Module 3 : Writing Skills: Writing business letters - enquiries, complaints, sales, adjustment, collection letters, replies to complaint & enquiry letters; Job applications, Résumé, Memo, Notice, Agenda, Reports – types & format, E-mail etiquette, advertisements. 4L + 4T

Module 4 : Listening & Speaking

Listening: Listening process, Types of listening; Barriers in effective listening, strategies of effective listening
Speaking: Presentations, Extempore, Role-plays, GD, Interview. 4L + 4T

Suggested readings:

1. Bhatnagar, M & Bhatnagar, N (2010) Communicative English for Engineers and Professionals. New Delhi: Pearson Education.
2. Raman, M & Sharma, S (2017) Technical Communication. New Delhi: OUP.
3. Kaul, Asha (2005) The Effective Presentation: Talk your way to success. New Delhi: SAGE Publication.
4. Sethi, J & Dhamija, P.V. (2001), A Course in Phonetics and Spoken English. New Delhi: PHI.
5. Murphy, Raymond (2015), English Grammar in Use. Cambridge: Cambridge University Press.

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Semester-II

BDN(T) 201 Basic Chemistry
4 credits, Total-48 hours

Course Objectives:

1. Understanding of the fundamental theories and basic concepts of Thermodynamics.
2. Understanding of the fundamental theories and applications of the concepts of dilute solutions, Colligative properties, Electrochemistry, Ionic Equilibrium.
3. Insight into the instrumental methods of spectral analysis and learning about the basic laws of photochemistry and various photochemical processes.
4. Learning about the chemistry of colloids and emulsions.
5. Learning about the chemistry of nanomaterials, the basics of nanotechnology and its related applications in food industries.

Sl. No.	Course Outcome (CO)
1	Outline and illustrate the skills and application of mathematical tools to calculate thermodynamic and kinetic properties
2	Able to understand the relationship between microscopic properties of molecules with macroscopic thermodynamic observables
3	Able to understand the use of simple models for predictive understanding of physical phenomena associated to chemical thermodynamics and kinetics
4	Remember and understand the limitations and uses of models for the solution of applied problems involving chemical thermodynamic and kinetics
5	Remember and understand the concept of acid/base equilibria, including pH calculations, buffer behavior, acid/base titrations, and their relationship to electrophiles and nucleophiles

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6	Remember and apply the level of skill required to understand and implement the historical evolution and current revolution that is nanoscience, the fundamental uniqueness of the chemical and physical properties of nanomaterials and their potential impact in science, engineering, medicine, and the environment, the interdisciplinary nature of nanoscience, top down and bottom up methods of nanomaterials preparation, examples of different nanomaterials, applications of nanomaterials with emphasis in food sector
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Unit I: Thermodynamics

Systems: Open, Close, Isolated. Definition with examples of Diathermic and Adiabatic walls. Extensive and Intensive property. Process: Isothermal, Adiabatic, Isobaric, Isochoric.

First Law of Thermodynamics: Statement and mathematical form.

Internal energy: Definition, Example, Change in internal energy for ideal gas.

Enthalpy: Definition, Example, Change in internal energy for ideal gas.

Heat Capacity: Definition, Classification of heat capacity (C_p and C_v), Expression of C_p and C_v for ideal gas.

Reversible and Irreversible Processes: Definition. Work done in both processes for ideal gasses. Adiabatic

Process: Work done. Second Law of Thermodynamics. Concept of Entropy: Introduction Expression (Mathematical). Change in entropy for both reversible and irreversible processes. Work functions and free energy:

Gibbs and Helmholtz free energy. Condition of spontaneity of reaction.

Unit II: Dilute solutions– Colligative properties Lowering of vapor pressure of solution, elevation of boiling point, freezing point depression, definition, principles, and laws of osmotic pressure.

Unit III: Electrochemistry:

Electrochemistry I: Conductance of Electrolytic solution. Specific conductance, Equivalent conductance, molar conductance, Ion conductance. Kohlrausch's law of independent migration of ions.

Electrochemistry II: Cell and EMF. Nernst's equation.

Ionic equilibrium: Solubility and solubility product, common ion effect, determination of solubility product by EMF method, ionic product of water, pH, pOH, hydrolysis of salt solutions: Strong acid and weak base, weak acid and strong base, weak acid and weak base, concepts of buffer. Concepts of molarity, normality, molality, equivalent

Unit IV: Reaction Mechanisms:

Reaction Dynamics: Reaction Laws: Rate and Order. Molecularity. Zero, First, and Second order Kinetics.

Pseudo-molecular and Arrhenius reaction. Transition and Collision state theory.

Unit V: Colloid Chemistry:

Definition of colloid, principle of colloid formation, types of colloid, colloid preparation, stability of colloid, association of colloid and emulsion.

Unit VI: Photochemistry

Instrumental methods of spectral analyses, Photochemistry: Lambert's law and Beer's Law, Laws of photochemistry, Photochemical processes.

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Reference Books:

1. Engineering Chemistry: Bandyopadhyay and Hazra
2. Physical Chemistry: P.C. Rakshit
3. Organic Chemistry: Finar, vol-1
4. Engineering Chemistry: B.Sivasankar, Tata Mc Graw Hill, 2008
5. A Text book of Engineering Chemistry: S.S.Dara, 10th Edition, S.Chand & Company Ltd., New Delhi, 2003.
6. Engineering Chemistry Simplified: S. Nandi and R. Bhattacharyya, Chayya Prakashani Pvt. Ltd.
7. Advanced practical chemistry, 3rd edition by Subhas C Das.
8. An advanced course in practical chemistry by Ghoshal, Mahapatra and Nad

BDN 291 Basic Chemistry - II
2credits, Total-28 hours

1. Determination of surface tension and viscosity.
2. Determination of hardness of water.
3. Determination of chloride content of water.
4. pH metric titrations.
5. Thin layer chromatography.
6. Preparation and standardization of Mohr's solution by KMnO_4 solution.
7. Preparation of standard $\text{K}_2\text{Cr}_2\text{O}_7$ solution and standardization of Mohr's Salt solution.
8. Estimation of Iodine in common salt by standard sodium thiosulfate solution

BDN(T)202 Food Science
4 credits, Total-48 hours

Course Objective:

Make use of the chemistry that underlies in the Classification, Structure & properties of various calorie giving food components.

Sl. No.	Course Outcome (CO)
1	Understand and remember the concept of food groups and their functions
2	Know about pulses and grams
3	Familiarize with milk and beverages.
4	Understand and remember the concept of meat.

UNIT-I

Food groups: Basic 4, 5&7 food groups. Functional food groups-energy yielding, body building and protective foods (only sources and not properties and functions). Food Pyramid, My Plate. Study of various cooking methods - Boiling, steaming, stewing, frying, baking, roasting, broiling, cooking under pressure. Cereals - composition of rice, wheat, effects of cooking on parboiled and raw rice, types of starch, principles of starch cookery, gelatinization. Food group- Grouping of foods, discussion on nutritive

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value

UNIT-II

Pulses and grams – Varieties of pulses & grams, composition, nutritive value, cooking quality of pulses, germination, and its effect. Vegetables - Classification, composition, nutritive value, selection and preparation for cooking, methods and principles involved in cooking. Fruits - Composition, nutritive value, changes during ripening, methods and effects of cooking, enzymatic browning.

UNIT -III

Beverages - Classification, nutritive value, Milk based beverages- methods of preparing tea and coffee, fruit-based beverages and preparation of carbonated non – alcoholic beverages. Spices and Condiments - Uses and abuses. Fats and Oils - Types of oils, function of fats and oils, shortening effects of oil, smoking point of oil, factors affecting absorption of oil. Sugar cookery- Stages of sugar cookery, crystallization and factors affecting crystallization.

UNIT-IV

Milk - Composition, nutritive value, kinds of milk, pasteurization and homogenization of milk, changes in milk during heat processing, preparation of cheese and milk powder
Egg - Structure, composition, classification, nutritive value, uses of egg in cookery, methods of cooking, foam formation and factors affecting foam formation.

UNIT-V

Meat -Structure, composition, nutritive value, selection of meat, post mortem changes in meat, aging, tenderness, methods of cooking meat and their effects. Poultry – types, composition, nutritive value, selection, methods of cooking.
Fish - Structure, composition, nutritive value, selection of fish, methods of cooking and effects.

Unit-VI

Food evaluation (Subjective and objective)

Reference Books:

1. Food science, Chemistry and Experimental foods by M. Swaminathan.
2. Food Science by Norman.N.Potter.
3. Experimental study of Foods by Griswold R.M.
4. Food Science by Helen Charley.
5. Foundation of Food Preparation by A.G. Peckam.
6. Modern Cookery for teaching and trade, volume I&II ,Thangam Philip. Orient Longmans Ltd.
7. Food Fundamentals by Mac Williams, John Willy and son`s, NewYork.
8. Food Facts & Principles by Shakuntala manay &Shadakhraswamy.
9. Food Science by Srilakshmi , second edition,2002.

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BDN 292 Food Science Practical:
2 credits, Total-28 hours

1. Measuring ingredients Methods of measuring different types of foods –grains, flours & liquids
2. Edible portion: Determination of edible portion percentage of different foods (mention name of foods).
3. Cooking methods Moist heat methods – (i) boiling, simmering (egg recipes), steaming, & Pressure cooking, (ii). Dry heat methods – baking. (iii), Fat as a medium for shallow cooking and deep fat frying.
4. Methods of cooking and preparations- cereals, pulses (soaked and unsoaked), vegetables (different colour and texture) Preparation of soups and salads. Prevention of darkening in fruits & vegetables, milk, and milk product (curd, homemade cheese, flocculation).
5. Beverages: Preparation of hot beverages- coffee, tea. Preparation of cold Beverages-fruit drinks & milkshakes.

AECC 2- Environmental Science
Semester Credits- 2T

Course Objective: The course is designed to provide a working knowledge of environment, ecology and physical sciences for problem solving. The learner will be able to remember, understand and apply the taught concepts and methods involving social and environmental processes for betterment of environmental health and safety.

COURSE OUTCOMES (CO):

SI	Course Outcome	Mapped modules
1	Be able to remember the basic concepts related to environment & ecology	M1,M2
2	Be able to remember & understand the scientific problem related to air, water, noise & land pollution	M1, M2
3	Be able to understand environmental laws , regulations , guidelines and n applying those for maintaining quality of environmental health and safety .	M1, M2,M3

Module Number	Content	Total Hours	%age of questions	Covered CO	Blooms Level
Module 1	Environmental Concepts	7	30%	1,2	L1
Module 2	Resources & Pollution	6	30%	2,3	L1, L2
Module 3	Environment Management	7	40%	1,2,3	L2,L3

SYLLABUS

Module 1: Environmental Concepts – Definition & basic concept of Environment & Ecology, man, society & environment, their interrelationship, Elements of ecology elements of ecology - species,

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population, community, definition of ecosystem- Structure & function of ecosystem (Bio geo chemical cycles, food chain, energy flow, ecological pyramid), Biodiversity & its threats and remedies. [7]

Module 2: Resources & Pollution – renewable & non-renewable resources, Bio-degradable and non-biodegradable pollutants, Sources & Effects of Pollution, Methods of Control (Air, Water, Land, & Noise)

Module 3: Environment Management - Concept & scope of environment Management, National environmental policy & Environmental Legislations in India, Environment Management System – ISO 14000, Environmental Audit, Eco mark, green Industry, Cases on Environment Impact Assessment.

REFERENCES

Suggested Readings

1. N.K. Oberoi: Environmental Management, Excel Books
2. G.N. Pandey: Environmental Management, Vikas
3. K.M. Agrawal & P.K. Sikdar: Text Book of Environment, MacMillan
4. L.W. Canter: Environmental Impact Assessment, McGraw Hill
5. M.P. Poonia & S.C. Sharma, Environmental Studies, Khanna Publishing House (AICTE Recommended Textbook – 2018)
6. Masters, G. M., “Introduction to Environmental Engineering and Science”, Prentice-Hall of India Pvt. Ltd.,1991.
7. De, A. K., “Environmental Chemistry”, New Age International
8. Fundamentals of Ecology -Odum, E.P.
9. Instant notes on Ecology -Mackenzie, A., Ball, A.S. and Virdee, S.R. (1999) Viva Books
10. G. Dasmahapatra – Basic Environmental Engineering & Elementary Biology, Vikas Publication
11. Environmental Science, Cunningham, TMH
12. Environmental Pollution Control Engineering, C.S.Rao, New Age International
13. Environmental Science, Wright & Nebel, PHI
14. Environmental Pollution Analysis, S.M.Khopkar, New Age International

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Semester-III

BDN 301 Human Physiology-I

4 credits, Total-48 hours

Course Objectives

1. To impart basic knowledge about the organelles of a typical cell and to describe their functions.
2. To develop an idea on Circulatory and Excretory system, Digestive System, Respiratory System, Immune System

Sl. No.	Course Outcome (CO)
1	Explain and recall the structure of cells and its different parts including their functions.
2	Construct the knowledge on chromosome, Chromosomal and mitochondrial DNA, DNA packing, human genome
3	Illustrate the structure, function and mechanism of Circulatory and Excretory system, Digestive System, Respiratory System, Immune System.

UNIT-I **8hrs**

Cell - Structure and functions, Cellular transport-active and passive, ion channels & ionophores, Intercellular communication: basic idea about tight junction, gap junctions, adherens junction, extracellular matrix, Chromosome structure: Morphology, chromosomal DNA packing, Chromatin, Human genome, Mitochondrial DNA, Epistasis, Penetrance, Expressivity, Pleiotropism, Karyotyping. Cell cycle, Cell division, Crossing-over, Linkage.

UNIT-II **8hrs**

Digestive system - Anatomical consideration – structure & functions, Digestive glands and its structure and function, Enterohepatic circulation, Movement of alimentary canal, Brief study of the organization of the digestion, absorption and assimilation of food, Defecation.

UNIT-III **8hrs**

Tissues Structure and functions, Blood, RBC, WBC, Platelets and Lymph. Blood coagulation, blood grouping and Rh factor.
 Circulatory system - Heart structure and functions - cardiac cycle, cardiac output, electrocardiography, cardiovascular homeostasis, blood pressure, pulse, coronary circulation, baroreceptors, chemoreceptors.

UNIT-IV **8hrs**

Excretory system - Excretory organs - structure of kidney and functions, formation of urine, renal regulation-acid-base balance, composition of urine. Renal function tests, Non-excretory functions of kidney, Structure and functions

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of skin, Sweat gland, regulation of body temperature, hypo-hyperthermia, concept on pyrogens, pyrexia.

UNIT-V 8hrs

Respiratory system - Basic anatomy of the respiratory system, mechanism of breathing, spirometry process of respiration, transport and exchange of oxygen and carbon dioxide in the body. Regulation of respiration, Disorders of breathing,

UNIT VI 8hrs

Immune system: adaptive immunity, innate immunity, role of different W.B.Cs in immunity, cell signaling

Reference Books:

1. Chaterjee, C.C., Human Physiology, Vol-I&II Medical allied agency, Calcutta 13th Edition,2020
2. Best and Taylor, Living body. Mc.Graw hill company, Newyork.
3. Sathya Narayana, Essentials of Biochemistry (2000).
4. Saratha Subramanian, Text of Human Physiology (2000).
5. Stuart Ira Fox, Human Physiology (2003)
6. Guyton & Hall Textbook of Medical Physiology_3rd SAe-E-Book: Third South Asia Edition,2020

BDN 391 Human Physiology-I Practical
2 credits, Total-28 hours

1. Identification of tissues
2. Bleeding time
3. Clotting time, Blood groups –identification
4. Measurement of Hemoglobin
5. Measurement of Pulse Rate
6. Measuring of Blood Pressure
7. Measurement of height, weight and calculation of BMI
8. RBC, WBC –demonstration,
9. Determination of Packed Cell Volume(PCV)

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BDN(T) 302 Biochemistry-I
4 credits, Total-48 hours

Course Objectives:

1. To acquaint the students with the basic concepts of Biochemistry and metabolism.
2. To acquaint the students with the basic concepts and functions of enzymes, coenzymes.
3. To acquaint the students with the basic structures and functions of carbohydrates, proteins & amino acids.

Sl. No.	Course Outcome (CO)
1	Demonstrate the basic concepts and functions of different enzymes and various coenzymes.
2	Apply basic knowledge about the structure, function and metabolism of carbohydrate
3	Relate basic knowledge about the structure, function and metabolism of amino acid, protein.

UNIT 1

8hrs

Introduction to Biochemistry: Definition, objectives, scope and inter-relationship between biochemistry and other biological sciences. **Introduction to Enzymes;** Introduction to enzymes, Coenzymes, Classification of enzymes, Enzyme Inhibition. Factors affecting the enzyme activity. Coenzymes and their functions in the metabolism of carbohydrates, lipids and proteins.

UNIT 2

16hrs

Carbohydrates; Definition, Structure and general properties of: Monosaccharides glucose, fructose, galactose, ribose. Disaccharides – maltose, lactose, sucrose. Polysaccharides – dextrin, starch, glycogen. Metabolism of Carbohydrates: Introduction, anabolism, catabolism, metabolism. Glycogenesis, Glycogenolysis, Glycolysis, Kreb's cycle, energy output, Homeostasis of blood sugar-role of hormones, Glucose Tolerance Test.

UNIT 3

8hrs

Proteins: Definition, classification, elementary knowledge of structure of proteins, biomedical importance.

UNIT 4

16hrs

Amino acids; Definition, classification, Essential and non- essential amino acids, structure of important amino acids. **Metabolism of proteins:** Dynamic equilibrium, nitrogen balance, essential Amino acids, Glycogenic, Ketogenic, and both glycol-ketogenic amino acids. Oxidation of amino acids- Transamination, Deamination- Oxidative, Non-oxidative, Decarboxylation. Metabolism of carbon skeleton, Metabolism of ammonia -Urea cycle.

Reference Books:

1. Lehninger A L, Nelson D L and Cox M M (2009). Principles of Biochemistry, 6th Ed. CBS Publishers and Distributors.
2. Murray R.K, Granner D K, Mayes P A and Rodwell V W (2009).Harper's Biochemistry, 28th Ed, Lange Medical Book.

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3. Hawk PB, Oser BL and Summerson WH (1954). Practical Physiological Chemistry, Mcgraw Hill, New York.
4. Sundararaj P and Siddhu A (2006). Qualitative Tests and Quantitative Procedures in Biochemistry. Elite Publishing House Pvt. Ltd., New Delhi.

BDN 392 Biochemistry-I Practical:

2 credits, Total-28 hours

Qualitative Methods

1. Qualitative tests for mono, di and polysaccharides and their identification in unknown mixtures
2. Qualitative tests for proteins

Quantitative Methods:

1. Estimation of total carbohydrates by Anthrone method.
2. Quantitative estimation of reducing sugars by Dinitro Salicylic acid (DNS) method.
3. Estimation of total protein by Lowery's method
4. Quantitative estimation of glucose by GOD/POD method
5. TLC/Paper Chromatography of protein

BDN(T) 303 Public Health Nutrition

4 credits, Total-48 hours

Course Objectives:

1. To identify individuals or population groups at risk of becoming malnourished
2. To know the steps and methods involved in nutrition and health education.
3. To evaluate nutrition and health education programs.

Sl. No.	Course Outcome (CO)
1	Develop of the concept of the community
2	Apply the concept of the nutritional assessment
3	Familiarize with the different nutritional assessment methods
4	Relate basic knowledge of diet survey methods
5	Identify some nutritional deficiency clinically
6	Explain the concept regarding the regional agencies and organizations and their duties.

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UNIT I: 8hrs

Concept of Community Health & Nutrition

Concept of Community- types of community, factors affecting health of the community. Health Care- Levels of health care- Primary Health Care- Primary health care, health care delivery, National immunization schedule, Role of public nutritionist in health care delivery.

UNIT II: 8hrs

Nutritional Problem of Community

Nutritional and Non- nutritional- Incidence of nutritional problems, signs, symptoms and treatment- Protein Energy Malnutrition-Micronutrient deficiencies (Vitamin-A, Iron, Iodine), Fluorosis.

Impact of NCDs on public health: Obesity, DM 2, CVD, Cancers and Osteoporosis and hip fractures.

UNIT III: 8hrs

Demography, nutrition and quality of life

Demographic cycle- Population trends in India- Population structure- sex composition- Age composition- Fertility behavior- Vital statistics in vulnerable groups, population growth (Maternal Mortality rate, Infant Mortality Rate, Net Reproduction Rate).

Causes of malnutrition, consequences of malnutrition, Intervention in malnutrition- Food security- PDS, Food production- Food Pricing

UNIT IV: 8hrs

Method and Assessment of Nutritional Status

Identification of risk groups (random and purposive) Direct assessment – Diet surveys methodology (weighment and 24-hour recall method), Anthropometry, Clinical and Biochemical Estimation- Indirect assessments- Food balance sheets and Agricultural Data. Use of growth charts.

UNIT V: 8hrs

National and International agencies and Intervention Programmes:

a) FAO, WHO, UNICEF, ICMR, CSIR, NIN, CFTRI

b) ICDS, Mid-Day Meal Programme, NIDDCD Fortification and Enrichment of foods.

UNIT VI: Nutritional epidemiology 8hrs

An Introduction to epidemiology, Historical aspects, definition, aim and uses - Descriptive epidemiology - Determinants of disease, Natural history of disease - Epidemiological principles in prevention and control of disease.

BDN 393 Public Health Nutrition Practical
2 credits, Total-28 hours

1. Measurement of the height and weight, and determination of the BMI of adolescents /adults and comment on their nutritional status.
2. Determination of MUAC of under 5 children.
3. Diet survey of a family by 24 hour recall method
4. Development of a Pictorial Dietary Ready Reckoner of some of the common standardized recipes for community use.
5. Development and demonstration of following aids for health education- for adolescent girls/rural women/school going children/pregnant woman/lactating woman: a) Posters, b) Flash Cards

Reference Books:

1. Bamji SM, Rao NP and Reddy V, Textbook of human nutrition, oxford and IBH publishing co., New Delhi.

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2. Gopalan C, Combating under-nutrition-basic issues and practical approaches, Nutrition Foundation of India, 1987.
3. Gopalan C, Women and nutrition in India, NFI, New Delhi, 1992.
4. Jelliffe D.D. 1966. The assessment of Nutritional Status of the Community. WHO, monograph series.
5. Jelliffe D.D. 1966. The assessment of Nutritional Status of the Community. WHO, monograph series.
6. Michael J.G, Barrie M.M: Public health nutrition, Blackwell publishing, 2005.
7. Nweze Eunice Nnakwe., Community Nutrition – planning health promotion and disease prevention., Jones And Bartlett publishers, 2009.
8. Park K., Park's textbook of preventive and social medicine., 12th edition. M/S Banarsidas bhanot publishers, 2009.
9. Reddy V, Prahlad Rao N, Sastry G and Nath KK, Nutrition trends in India, Hyderabad, NIN, 1993

BDN 304 Sports Nutrition
Credits-2 Total-28 hours

Course Objectives:

1. To impart basic knowledge about the objectives, importance and principles of sports nutrition .
2. To know the steps and methods involved in planning nutritional guidelines for different sports activities.
3. Impart basic knowledge about Pre- event meal and diets for athletes.

Sl. No.	Course Outcomes (COs)
1	Acquaint with the sports nutrition
2	Develop the concept of the benefits of physical activity and exercise
3	Construct the concept regarding the classification of Sports activities
4	Outline 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:

1. Campbell B (2017): 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. Brouns F (2002): Essentials of Sports Nutrition, 2nd Revised Ed. Wiley-Blackwell.
5. Bean A (2017): The Complete Guide to Sports Nutrition, 8th Ed. Bloomsbury Sport.
6. Benardot D (2011): Advanced Sports Nutrition, 2nd Ed. Human Kinetics Publishers.
7. Srilakshmi B (2014): Dietetics, 7th Multicolour Ed. New Age International (P) Ltd

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Semester-IV

BDN(T)401 Nutrition & Life Cycle
4 credits, Total-48 hours

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	Recall basic knowledge about nutrition.
2	Relate 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:

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 **16hrs**

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.

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BDN 491 Nutrition & Life Cycle Practical
2 credits, Total-28 hours

1. Preparation of Complementary Feeds for Infants-weaning foods
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.
4. Planning and preparation of a day's diet for an adult man/woman (sedentary/moderate/ heavy worker) P
5. 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.,Arline,M.T.(2000):Krause'sFood,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., MacMillan Publishing 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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BDN(T) 402 Diet Therapy I
4 credits, Total-48 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	Recall the Basic concepts of diet therapy.
2	Explain the 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 and apply the knowledge and skills required for implementation of dietary management for the diseases of the liver and biliary system as well as cardiovascular diseases.

Unit I

4hrs

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

4hrs

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

8hrs

A. Nutrition during Febrile Disorders:

- a) Classification of fevers
- b) Metabolism
- c) General Dietary Considerations
- d) Acute & chronic fevers -Typhoid Tuberculosis

B. Nutrition for Weight Management

8hrs

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.

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Unit III

A. Nutrition in Gastrointestinal Disorders 8hrs

General Dietary Considerations for healthy gut

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

B. Nutrition in Diseases of the Liver 8hrs

Hepatitis: Types, Etiology, Symptoms, Treatment Cirrhosis: Etiology, Clinical Symptoms,

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

C. Nutrition in Cardiovascular Disorders 8hrs

Atherosclerosis – Introduction, Etiology, Multiple Risk Factors, Treatment, Diet and Feeding Pattern, 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

BDN 492 Diet Therapy I- 2 credits, Total-28 hours

1. Planning and preparation of diets for diarrhea & constipation
2. Planning and preparation of diets for febrile conditions -Typhoid and Tuberculosis
3. Planning and preparation of diets for obese and underweight patients
4. Planning and preparation of diet for Peptic Ulcer patients
5. Planning and preparation of diet for viral hepatitis and cirrhosis of liver P
6. Planning and preparation of diet for hypercholesterolemia P
7. 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, New Delhi. R
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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BDN(T) 403 Human Physiology-II

4 credits, Total-48 hours

Course Objectives

1. To impart basic knowledge about the nervous system and its functions.
2. To develop an idea on Reproductive system and Sense organ, Endocrine glands, and Musculoskeletal system

Sl. No.	Course Outcome (CO)
1	Recall and rephrase the structure and functions of the nervous system.
2	Relate the structure, function and mechanism of Reproductive system and Sense organ, Endocrine glands, and Musculoskeletal system

UNIT-I

8hrs

Nervous System: Structural organization of different parts of brain and spinal cord, Reflex action-definition, reflex arc, classification and properties. Autonomic nervous system: Organization, outflow, ganglia, centers and functions, Chemical transmission in autonomic nervous systems. **CSF:** Formation, circulation and functions, Blood-CSF and Blood-Brain barrier, Ascending and descending tracts, Functions of the spinal cord, Muscle spindle and golgi tendon organ, **Brain:** Structure, nerve connections and functions of brain, Thalamus, Hypothalamus, Physiology of sleep, learning, memory and emotions, cerebral circulation and stroke.

UNIT-II

8hrs

Reproductive System: Primary and accessory sex organs and secondary sex characteristics. Spermatogenesis, Histology of ovary and testis, Oogenesis and ovulation, Physiology of puberty. Menstrual cycle and its regulation, Onset of menopause and postmenopausal changes, Structure and function of placenta, Pregnancy, Parturition, Development of mammary gland, lactation and their hormonal control

UNIT-III

8hrs

Sense organs - Structure and function of eye, ear, nose, tongue and skin.

UNIT-IV

12hrs

Endocrine glands - Hypothalamus as neuroendocrine organ, Structure and function of pituitary, Pineal gland, Thyroid and Parathyroid gland, Adrenal cortex and medulla, Pancreatic islets of langerhans. Gastro-intestinal hormones.

UNIT-V

12hrs

Muscles - physiology of muscular action. Structure of skeletal, smooth and cardiac muscles, The sarco tubular

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system, Muscle group, excitability, contractility, summation of stimuli, summation of contractions, Muscle proteins,

Reference Books:

1. Chatterjee, C.C., Human Physiology, Vol-I&II Medical allied agency, Calcutta 13th Edition, 2020
2. Best and Taylor, Living body. Mcgraw hill company, Newyork.
3. Saratha Subramanian, Text of Human Physiology(2000).
4. Stuart Ira Fox, Human Physiology (2003)

BDN 493 Human Physiology Practical-II

2 credits, Total-28 hours

1. Preparation and staining of blood film with Leishman's stain
2. Cell viability study by Trypan Blue staining
3. Identification of blood cells
4. Total count of W.B.C and R.B.C
5. Differential count of W.B.C
6. Microscopic structure of various Glands-Thyroid, pituitary, adrenal
7. Microscopic structure of reproductive Organs-Ovary, uterus, mammary gland, testis

BDN 404 Public Health

2 credits, Total-28 hours

Course Objectives:

1. To learn the health parameters and its dimensions.
2. To learn the different contaminated foods and its impact on public health.

Sl. No.	Course Outcomes (COs)
1	Classify the concept of health vs. absence of disease, vital statistics.
2	Demonstrate the concept of immunization, and its importance.
3	Explain the concept of different wastes, and waste management.
4	Outline the concept of Epidemiology.

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5	Rephrase the concept of Communicable and infectious disease control
6	Relate the concept of Public health hazards due to contaminated foods.

Unit I: 8rs

Principles and practices of public health. Positive health Versus Absence of disease. Introduction to Health System and Policy in Developing Countries.

Unit II: 8hrs

Secondary Sources of Community Health data: Reproductive, Maternal Health, Child Health and adolescent.

Unit III: 8hrs

Immunization: Importance and Immunization schedule for children, adults and for foreign travelers.

Unit IV: 8hrs

Community Water and Waste Management: Importance of water to the community, etiology and effects of toxic agents, water borne infectious agents, sources of water, safe drinking water, potable water, waste and waste disposal, sewage disposal and treatment, solid waste and disposal, liquid waste disposal.

Unit V: 8hrs

History of Epidemiology Measurements in Epidemiology, Incidence and prevalence, Causation and association, Measures of association

Unit VI: 4hrs

Outline of study designs (including cross sectional study design, case control study design, cohort study design and randomised control trials), Introduction to confounding and bias, Screening tests- validity and reliability methods, Disease surveillance, Outbreak investigation, Communicable and non-communicable diseases.

Unit VII: 4hrs

Public health hazards due to contaminated foods: Food borne infections and intoxications: symptoms, mode of transmission and methods of prevention, investigation and detection of food borne disease outbreak

Reference books

1. Smith, G.W.: Preventive Medicine and public health. 2nd edition. McMillan Co. New York.
2. Park: Park's Textbook of preventive and Social Medicine. 9th Edition. M/s. Banarasi Das Bhanot. Jabalpur.

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3. SeshubabuVVR(2011): Review in Community Medicine, 2nd Ed, Paras Medical Books Pvt Ltd.
4. Mahajan BK, Roy RN , Saha I, Gupta, MC (2013):Text book of Preventive and Social Medicine, 4th Ed. Japee Brothers.
5. Vir SC(2011): Public Health Nutrition in Developing Countries, Woodhead Publishing India.
6. Willett W(2012): Nutritional Epidemiology, 3rd Ed. Oxford University Press,USA.

Semester-V

BDN(T)501 Diet Therapy II
4 credits, Total-48 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 nutritional care for diabetes management.
2	Illustrate and apply the knowledge and skills required for planning and preparation of diet in kidney diseases.
3	Infer and apply the knowledge and skills required for planning and preparation of diet for food allergy, food intolerance, surgical conditions, and metabolic disorders.
4	Summarize and apply the knowledge and skills required for preparation of diet plan for cancer.

Unit I Nutrition in Diabetes Mellitus

12hrs

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 (A2C)Hb A1C Management - Principles of Nutritional Therapy-

I (i) Care of Insulin Dependent Diabetes Mellitus
 (ii) Insulin Therapy
 iii) Testing Methods for Monitoring Results-

a) SBGM b) HbA1C c) Urine Testing
 II Care of Non-Insulin Dependent Diabetes

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

Unit II Nutrition in Renal Diseases: 8hrs
 Renal Function in Disease, Etiology, Clinical Symptoms and Course of Disease, Treatment – Dietary Management, Feeding Pattern for
 (i) Glomerulonephritis
 (ii) Nephrotic Syndrome
 (iii) Chronic Kidney disease
 (iv) Kidney Dialysis

Unit III Nutrition in Surgical Conditions 4hrs
 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
 d) Infections-UTI and HIV

Unit IV Food Allergy and Food Intolerance 4hrs
 Definitions, Symptoms, Risk Factors, Food Intolerances, Diagnosis, Food Challenge, Treatment

Unit V Metabolic Disorders 8hrs
 Gout-etiology, Symptoms, & nutritional management

Unit VI Cancer 12hrs

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

BDN 591 Diet Therapy II-Practical
2 credits, Total-28 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

BDN(T) 502 Biochemistry II
4 credits, Total-48 hours

Course Objectives:

1. To acquaint the students with the basic concepts of vitamin, hormone and mineral metabolism.
2. To acquaint the students with the basic structures and functions of lipids and nucleic acids.

Sl. No.	Course Outcome (CO)

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1	Apply basic knowledge about the structure, function and metabolism of lipids.
2	Interpret basic knowledge about the structure, function of vitamins & minerals.
3	Illustrate basic knowledge about the structure, synthesis & metabolism of nucleic acid.

UNIT 1 **8hrs**

Lipids: Definitions and classification of lipids. Types and properties of fatty acids Composition and properties of fats. Significance of acid value, iodine value and saponification value **Metabolism of lipids:** Introduction, β -oxidation of fatty acids, Biosynthesis of fatty acids, Synthesis of triglycerides, Synthesis of cholesterol and atherosclerosis (in brief).

UNIT 2 **8hrs**

Vitamins: Structure and biochemical role

Fat soluble vitamins – A, D, E, K.

Water soluble vitamins – B1, B2, niacin, pantothenic acid, pyridoxine, folic acid, B12 and C

UNIT 3 **8hrs**

Minerals:

Biological role and occurrence of inorganic elements – iron, calcium, phosphorous, iodine, selenium and zinc

UNIT 4 **12hrs**

Integration of carbohydrate, lipid and protein metabolism. Bioenergetics-Exergonic and endergonic reactions, Electron Transport Chain and Oxidative Phosphorylation

Unit 5 **12hrs**

Nucleic acid and Nucleotide– DNA & RNA, Synthesis and Metabolism, DNA-replication, Transcription, Translation,

BDN 592 Biochemistry II Practical

2 credits, Total-28 hours

1. Properties of Fats (Acrolein Test, Baudouin Test)
2. Estimation of iodine value of fat/ free fatty acid value (sesame oil, groundnut oil, or coconut oil)
3. Estimation of calcium using EDTA by titration
4. Estimation of ascorbic acid by using 2, 6 dichloro phenol indophenols method
- 5.

TLC

/Paper Chromatography of lipid.

Reference Books:

1. Agarwal Anju.D(1989) A practical handbook for consumers, Indian Book Houses, Mumbai.
2. Boella M.J.,(1983): Personnel Management in the hotel and catering industry 1st Edition 1974. Barrie and Jenhins London

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3. Bessie B West, levelle Wood,(1966): Food Service in Institution 6thedn. Macmillan Publishing co
4. Gupta B.d. (1973):” Consumption patterns in India, Tata McGrawhill.
5. Lillicarp D. R., Food and Beverage service, 2nd edition Reprinted 1989,BLBS
6. Kinton and Casarani, Theory of catering 1981. Butter and Tanner Ltd,
7. Kotschevr and Terrell, Food Service Planning Layout and Equipment,1971.
8. Mahmood A Khan, Food Service Operations AVIPUBLISHING
9. Handbook of Food Preparations – A.M. Home Economics Association.
10. Sweetman, M.D., 4, Mackeller. Food Selection and Preparations
11. Oliver B. Watson. School Lunch Room Service
12. Lender H. Ketshevar and Marget Food service Planning: layout Equipment

BDN 581 Internship -I

6 credits, Total-48 hours

Course Objectives:

To gather practical knowledge in related fields

Sl. No.	Course Outcome (CO)
1	Recall and explain the concept of application of Dietetics and Nutrition Science in different field
2	Interpret and gather practical knowledge regarding the Health industry/Food industry/Community .

The students will attend internship training from any chosen discipline (Health industry/Food industry/Community) and at the end of the training one project will be submitted to the department for evaluation. (1 month)

BDN 504A Basics of Biostatistics

6 credits, Total-48 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.	Explain and recall the concept of Statistics including primary data, secondary data etc

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2	Demonstrate about various concept of probability
3	Rephrase about sampling method, ANOVA
4	Recall and apply the knowledge and skills required for data analysis using correlation, regression
5	Application 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- square test 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)

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Epidemiology. (Fifth Edition). Philadelphia, PA: Saunders Elsevier, Minium, E. W., King, B. M., & Bear, G. (1995/2004).

8. Statistical Reasoning for Psychology and Education. New York: Wiley and Sons. Muijs, D. (2004). Doing Quantitative Research in Education with SPSS. London

BDN 504B Food Fermentation
6 Credits, Total-48 hours

Course Objectives:

- 1.To learn about this industry
- 2.To learn the technicalities about it.

Course outcome:

- 1.Students will know about different types of fermented food and their preparation.
- 2.Relation with human health.
- 3.Benefits of different probiotic and prebiotic foods.

Unit 1 **8hrs**
Food Fermentation –definition and types,

Unit 2 **8hrs**
Microorganisms used in food fermentations.

Unit 3 **8hrs**
Dairy Fermentations-starter cultures and their types

Unit 4 **8hrs**
Concept of probiotics, prebiotic & immunobiotic.

Unit 5 **8hrs**
Probiotic & prebiotic difference, foods and its supplements.

Unit 6 **8hrs**
Fermented Foods-types, methods of manufacture for vinegar, sauerkraut, tempeh, miso, soya sauce, yoghurt, curd beer, and traditional Indian foods.

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Semester-VI

BDN(T)601 Food Safety and Quality control

4 credits, Total-48 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	Explain and recall the concept of food additives and their effect on human health.
2	Illustrate and recall the concept of the common adulterants in food and their effects on health.
3	Infer and recall the concept of the spoilage of different food infections and infestation
4	Application of basic techniques required for implementing the food laws, and their regulations.

UNIT-I

8hrs

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

8hrs

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

8hrs

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

UNIT-IV

12hrs

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

UNIT-V

12hrs

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

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and structured approach.

Reference Books:

1. Food science-Norman Potter
2. Food Technology-Presscott.S.C.andProcter
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 York 1988.
8. Mahindra-S.N.-Food safety –A techno-legal analysis-Tata McGrawhillpublishers 2000.
9. Manoranjan Kalia-Food processing and preservation. 10. Roday Food hygiene and sanitation.
11. Indian Food Industry, 2000, Vol 19:2

BDN 691 Food Safety and Quality Control

1 credits, Total-28 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 outbreak /any other.

BDN(T) 602 Geriatric Nutrition

4 credits, Total-48 hours

Course Objectives:

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

Sl. No.	Course Outcome (CO)
1	Recall and explain the concept of gerontology, geriatrics, and geriatric nutrition.
2	Demonstrate the concept of the Physiological and biochemical changes during old age.

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3	Explain and recall 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	Recall and utilize the concept of the major nutritional and health problems during old age.

Unit I:

8hrs

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

Unit II:

8hrs

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

Unit III:

8hrs

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.

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BDN 692 Geriatric Nutrition Practical
2 credits, Total-28 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)

BDN 603A Nutritional management and diet counselling
6 credits, Total-48 hours

Course Objectives:

1. To 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	Acquaint with term Dietician
2	Develop the concept of dietician in hospital and community
3	Demonstrate the concept of nutritional diagnosis, assessment, and care process.
4	Interpret and remember the concept of nutrition vs. medical diagnosis, Nutrition Interventions
5	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: **8hrs**

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

Unit VII: **8hrs**

Nutrition diagnosis, component nutrition vs. medical diagnosis

Unit VIII: **8hrs**

Nutrition Interventions: Definition and objectives

Unit IX: **8hrs**

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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BDN 603B Introduction to Business Management
6 credits, Total-48 hours

Course Objectives:

1. To familiarize students with the basic concepts of various fields of Management.
2. To develop an understanding of business facets and how it works to make profit.
3. To align the minds of the students to the business point of view of the Agribusiness Industry

Sr. No.	Course Outcomes (COs)
1.	To know the nature and functions of a Manager, also learn about the Planning, concept and the decision making process of the Organizational structure
2	To learn about various leadership styles and communication processes and also learn about basics concepts of economics related to management.
3	To learn about various Marketing techniques and understanding the minds of customers
4	To learn about financial management concepts and financial requirements of business
5	To apply various concepts about developing the right kind of Business in terms of Human Resource

Unit I: Basics of Principles of Management

8hrs

Definition, importance and nature of Management, challenges & trends of managers, ethics in managing and social responsibility of managers, planning and control, planning process and strategies, SWOT analysis, barriers to effective planning, Planning- control relationship, process of control, Decision Making & Organizing Nature, process of decision making, decision making under Certainty and Uncertainty, decision-tree, group-aided decision, brain-storming. Organizing – concept, nature and process of organizing, authority and responsibility, delegation and empowerment, centralization and decentralization, concept of departmentation.

Unit II: Leadership & Concepts of Managerial Economics

8hrs

Defining leadership and its role, should managers lead, leadership style, leadership development, Leadership behavior. Communication- Process, Bridging gap-using tools of communication, electronic media in Communication, Introduction of Managerial Economics, Demand Analysis, Production and Cost Analysis, Managerial Decision Making under Alternative Market Structures , Pricing Decisions, Externalities and Market Failure.

Unit III: Marketing Management

8hrs

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Definition, Concepts Significance & functions of Marketing, Fundamentals of Marketing - Role of Marketing - Relationships of Marketing with other functional areas, Buying Behavior, Marketing Mix, Market Segmentation, Sales Forecasting, Pricing, Advertising and Promotion, Marketing Research.

Unit IV: Financial Management

8hrs

Nature of Financial Management, Capital Budgeting, Cost of Capital, Capital Structures, Operating and Financial Leverage, Dividend Policy Decision, and Management of Working Capital.

Unit V: Human Resource Management

8hrs

Scope & Coverage of Human Resource Management, Development of HR Functions, Structure and Function of HR Manager, Role of Line Managers in Managing Human Resources, Human Resource Planning, Employment Administration, Compensation Management, Employee Benefits, Industrial Relations in India.

Unit VI: Production Management

8hrs

Basics of production Management: Labour productivity, location planning, Capacity Planning, Maintenance Management, Supply chain management, Purchasing and Warehousing, Materials management, Total Quality Management

Reference books:

1. Koontz – Principles of Management (Tata McGraw Hill, 1st Edition 2008)
2. Robbins &Caulter – Management (Prentice Hall of India, 8th Edition)
3. Marketing Management By Philip Kotlers
4. S.Bhatt: Financial Management, Excel Books
5. V.S.P. Rao: Human Resource Management, Excel Books
6. J.K, Sharma: Operations Research, Macmillian, 2013

BDN 681 Internship -II

6 credits, Total-48 hours

Course Objectives:

To gather practical knowledge in related fields

Sl. No.	Course Outcome (CO)
1	Recall the concept of application of Dietetics and Nutrition Science in different field
2	Develop and gather practical knowledge regarding the Health industry/Food industry/Community .

The students will attend internship training from any chosen discipline (Health industry/Food industry/Community) and at the end of the training one project will be submitted to the department for evaluation (1 month).