THE ASSAM
ROYAL GLOBAL UNIVERSITY
GUWAHATI

ROYAL SCHOOL OF MEDICAL AND ALLIED SCIENCES
(RSMAS)

DEPARTMENT OF NUTRITION AND DIETETICS

COURSE STRUCTURE & SYLLABUS

(BASED ON NATIONAL EDUCATION POLICY 2020)

FOR

M.Sc. IN NUTRITION AND DIETETICS
(2 YEARS SINGLE MAJOR)

W.E.F

AY - 2023 – 24

TABLE OF CONTENTS

M.Sc. in Nutrition & Dietetics

1. Preamble

The post graduate program in Nutrition and Dietetics has been designed to provide students a vast scope ranging from alleviation of malnutrition, preventive, promotive and therapeutic care in hospitals, in food industries as well as food service managers in various establishments. The specialists in Nutrition and Dietetics play a vital role in promoting the quality of life of individuals and communities, which contributes significantly to the economic and overall development of the nation.

The major objective of the programme is as follows:

1. To impart knowledge and develop capacities of the students through state of the art higher education in the area of Nutrition and Dietetics
2. To provide practical, field level experience in hospitals and food service establishments
3. To provide professionally competent manpower for academic and research institutions; hospitals and food industries; nutrition and health programs; food safety and quality control; consultancy and entrepreneurship
4. To plan a therapeutic diet according to the individual's requirement in health and disease conditions
5. To provide adequate nutritional counseling and to evaluate the nutritional needs of people of all age group. Therapeutic diet counseling of patients in the outpatient department

2. Introduction

The science that focuses on everything linked to food and its impact on our health and general wellbeing is called nutrition and dietetics, which is a branch of medicine. Dietitians and nutritionists work to promote healthy eating and assist people make better dietary decisions. Additionally, they support patients in finding a balance between healthy food and exercise.

3. Aim of the Post Graduate Degree Programme in Nutrition & Dietetics:

The aim of the postgraduate degree in Nutrition & Dietetics is to make the students gather knowledge and understand the various basic concepts innutrition & Dietetics. The students are required to improve upon their skills in handling laboratory instruments and learn about the principles and mechanism of working of the instruments. The understanding, knowledge and skills in planning nutrition in normal and therapeutic conditions through a well

developed teaching learning processes in the class. Practical skills will be obtained through laboratory work and presentation and articulation skills through various seminars and internship exposure. The students will also be mentored and guided through research projects in their final year of study.

4. **Career Opportunities:** Various scopes of career opportunities in Nutrition & Dieteticsare as follows.

- Nutritionists
- Dieticians
- Nutrition counsellor
- Nutrition programme planner
- Food Biochemists
- Food Microbiologists
- Food Quality Control Managers
- Food Inspector
- Production Manager
- Academics
- Entrepreneurs in the field

5. **Vision and Mission:**

VISION:

To create a cadre of nutritional professionals and integrate nutritional therapy widely in health care.

MISSION:

The Department of Nutrition and Dietetics is committed to:

- Create and share nutritional knowledge to ensure healthy and quality life
- Promote quality nutritional research

Students can also pursue higher studies such as Ph.D. programme in Nutritio& Dietetics or in allied sciences.

6. Post -Graduate Attributes:

The Learning Outcomes Descriptors and Post Graduate Attributes

Sl.no.	Post Graduate Attribute	The Learning Outcomes Descriptors *(The post graduates should be able to demonstrate the capability to)*
PGA1	Disciplinary Knowledge	Acquire knowledge and coherent understanding of the chosen disciplinary/interdisciplinary areas of study.
PGA 2	Complex problem solving	Solve different kinds of problems in familiar and non-familiar contexts and apply the learning to real-life situations.
PGA 3	Analytical & Critical thinking	Apply analytical thought including the analysis and evaluation of policies, and practices. Able to identify relevant assumptions or implications. Identify logical flaws and holes in the arguments of others. Analyse and synthesize data from a variety of sources and draw valid conclusions and support them with evidence and examples.
PGA 4	Creativity	Create, perform, or think in different and diverse ways about the same objects or scenarios and deal with problems and situations that do not have simple solutions. Think 'out of the box' and generate solutions to complex problems in unfamiliar contexts by adopting innovative, imaginative, lateral thinking, interpersonal skills, and emotional intelligence.
PGA 5	Communication Skills	Listen carefully, read texts and research papers analytically, and present complex information in a clear and concise manner to different groups/audiences. Express thoughts and ideas effectively in writing and orally and communicate with others using appropriate media.

PGA 6	Research-related skills	Develop a keen sense of observation, inquiry, and capability for asking relevant/ appropriate questions. Should acquire the ability to problematize, synthesize and articulate issues and design research proposals, define problems, formulate appropriate and relevant research questions, formulate hypotheses, test hypotheses using quantitative and qualitative data, establish hypotheses, make inferences based on the analysis and interpretation of data, and predict cause-and-effect relationships. Should develop the ability to acquire the understanding of basic research ethics and skills in practicing/doing ethics in the field/ in personal research work.
PGA 7	Collaboration	Work effectively and respectfully with diverse teams in the interests of a common cause and work efficiently as a member of a team.
PGA 8	Leadership readiness/qualities	Plan the tasks of a team or an organization and setting direction by formulating an inspiring vision and building a team that can help achieve the vision.
PGA 9	Digital and technological skills	Use ICT in a variety of learning and work situations. Access, evaluate, and use a variety of relevant information sources and use appropriate software for analysis of data.
PGA 10	Environmental awareness and action	Mitigate the effects of environmental degradation, climate change, and pollution. Should develop the technique of effective waste management, conservation of biological diversity, management of biological resources and biodiversity, forest and wildlife conservation, and sustainable development and living.

7. Programme Learning Outcomes relating to M.Sc degree programme in Nutrition and Dietetics.

Students post graduating with the degree M.Sc.(Nutrition and Dietetics) will be able to achieve the following:

PLO1: Knowledge of Nutrition and Dietetics**:** Students are able to demonstrate comprehensive knowledge and understanding of one or more disciplines such as chemistry, biochemistry, mathematics, statistics, microbiology, management; regulations with support of different allied subjects of Life Science, Physical Science.

PLO2: Develop the ability to solve complex problems: Identify, formulate, review research literature, and analyze diet related problems and design solutions to meet the specified dietary needs with appropriate consideration for the food sustainability and optimal health.

PLO3: **Develop Critical thinking and analytical reasoning ability:** Recognize the need for, and have the preparation and ability to engage in independent/ as an entrepreneur and life-long learning in the broadest context of nutritional and technological change, logical reasoning and capability of recognizing and distinguishing the various aspects of real-life problems.

PLO4: Develop the ability to create: Recognize new skills, ideas and technologies and its implementation in new product developments**.**

PLO5: Communication Skills: Communicate effectively and write effective reports and design documentation, make effective presentation through seminars, project dissertations

PLO6: Develop Research related skills: Acquire the practical knowledge and demonstrate the ability to design, conduct/ troubleshoot experiments and analyze in the field of Nutrition and Dietetics.

PLO7: Develop the skills for collaborative work and team building: Work effectively with healthcare organizations, food industries, laboratories and production processing team to build the technical and practical learning aspects.

PLO8: **Develop Leadership qualities:** Work effectively with the team work and building capabilities and leadership qualities for achieving the vision**.**

PLO9: Develop Digitaland technological skills: The completion of this programme will enable the learner to use appropriate software to apply for nutrition and dietary modules to work in community/healthcare organization.

PLO10: Develop Environmental awareness and imbibe skills for addressing the problems: Examining the role of health consciousness, environmental awareness and intention on purchase of organic food

8. CREDIT DISTRIBUTION

SEMESTER	CREDITS
I	22
II	24
III	27
IV	29

TOTAL CREDITS=102

9. Assessment and Evaluation:

Scheme of Evaluation

The following suggestive table indicates the distribution of marks for various components in a semester

	Component of Evaluation	Marks	Frequency	Code	Weightage (%)
A	**Continuous Evaluation**				
i	Analysis/Class test	Combination of any three from (i) to (v) with 10+10+15 marks each	1-3	C	45%
ii	Home Assignment		1-3	H	
iii	Project		1	P	
iv	Seminar		1-2	S	
v	Viva-Voce/Presentation		1-2	V	
vi	Mid term examination	MSE shall be of 10 marks	1-3	Q/CT	
vii	Attendance	Attendance shall be of 5 marks	100%	A	5%
B	Semester End Examination		1	SEE	50%
	Project				**100%**

M.Sc. Nutrition & Dietetics

Programme Structure

1st semester							
Sl.No.	**Subject Code**	**Names of subjects**	**L**	**T**	**P**	**C**	**TCP**
Core Subjects							
1	NDC154C101	Life Cycle Nutrition	3	1	0	4	4
2	NDC154C102	Advances in Nutritional Biochemistry	3	1	0	4	4
3	NDC154C103	Advances in Human Nutrition & Metabolism	3	1	0	4	4
4	NDC154C104	Research Methodology	3	1	0	4	4
5	NDC154C105	Food Science	3	1	0	4	4
6	NDC154C116	Practical I :Laboratory Techniques	0	0	8	4	8
		TOTAL CREDIT	**15**	**5**	**8**	**24**	**28**

2nd semester							
Sl.No.	**Subject Code**	**Names of subjects**	**L**	**T**	**P**	**C**	**TCP**
Core Subjects							
1	NDC154C201	Physiological Aspects of Nutrition	3	1	0	4	4
2	NDC154C202	Advances in Therapeutic Nutrition I	2	1	0	3	3
3	NDC154C203	Scientific writing skills	2	1	0	3	3
4	NDC154C204	Food Processing & Preservation	2	1	0	3	3
5	NDC154C215	Practical-II: Normal & Therapeutic Diets	0	0	6	3	6
		TOTAL CREDIT	**9**	**4**	**6**	**16**	**19**

3rd semester							
Sl.No.	**Subject Code**	**Names of subjects**	**L**	**T**	**P**	**C**	**TCP**
Core Subjects							
1	NDC154C301	Community & Public Health Nutrition	2	1	0	3	3
2	NDC154C302	Advances in Therapeutic Nutrition II	2	1	0	3	3
3	NDC154C303	Nutrition for critically ill patients	2	1	0	3	3
4	NDC154C304	Institutional Food Service Management	3	1	0	4	4
5	NDC154C305/ NDC154C315	Innovation in Food Product Development	2	0	4	4	6
6	NDC154C316	Menu Planning & Diet Counselling	0	0	6	3	6
		TOTAL CREDIT	**11**	**4**	**14**	**20**	**25**

4th semester							
Sl.No.	**Subject Code**	**Names of subjects**	**L**	**T**	**P**	**C**	**TCP**
Core Subjects							
1	NDC154C401	Research/Projects/internship	0	0	40	20	40
		TOTAL CREDIT	**0**	**0**	**40**	**20**	**40**

SYLLABUS (1ST SEMESTER)

Subject Name: Life Cycle Nutrition	**Scheme of Evaluation: (T)**
Subject Code: NDC154C101	**Credit Units: 3-1-0-4**

Course Objective:

Understand growth and development and nutritional requirement from pregnancy to elderly

Course Outcome:

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Remember** the nutritional requirement during life cycle	**BT 1**
CO 2	**Understand** the growth & development, RDA during different stages of life.	**BT 2**
CO 3	**Apply** the basic knowledge about nutritional requirement	**BT 3**
CO 4	**Analyse** the situation of deficiency and excess and consequences	**BT 4**
CO 5	**Evaluate** the functions and significance of different nutrients, RDA and their effects in deficiencies and excess**.**	**BT 5**

Detailed Syllabus:

Modules	Topics / Course content	Periods
I	**Nutrition during Pregnancy**: Prenatal growth and development, Nutritional requirements, RDA, Weight gain during pregnancy, Relationship between maternal and foetal nutrition, Teenage pregnancy and diet, General gastro intestinal problems, complications of pregnancy. **Nutrition during Lactation**: Physiological process of lactation, Nutritional requirements, RDA, Breast feeding- Colostrum and mature milk. Advantages of breast feeding- Nutritional benefit, hormones and growth, immunological benefits, psychological and economic, environmental benefits, infant and child morbidity. Barriers to breast feeding, Low milk production.	**12**
II	**Nutrition during Infancy**: Infant growth and Physiological development, Nutritional requirements for growth, RDA, Artificial feeding. Low birth weight and Preterm baby- Nutritional requirements, feeding the preterm baby, feeding problems. Weaning- Need for weaning, types of supplementary foods, problems in weaning. Nutrition in Preschool children: Growth and development, nutritional requirements, RDA, feeding dental problems and decay. Nutrition related problems of preschool children – Protein energy malnutrition- Types, symptoms, nutritional requirements and treatment.	**12**
III	**Nutrition in School children**: Nutritional requirements, RDA, Feeding problems, Packed lunches, Supplementary foods.	**12**

	Nutrition in Adolescents: Growth and development, Nutritional requirements, RDA, Nutritional problems- Obesity, eating disorders, predisposition to osteoporosis, anaemia, under nutrition, pre-menstrual syndrome, mal nutrition due to early marriage.	
IV	**Nutrition in Adults**: Growth and development, Nutritional requirements, RDA. **Nutrition in Old age:** General physiological changes, Theories on the causes of aging, Nutritional requirements, Nutrition related problems of old age, Degenerative diseases. Alzheimer's disease- Cause, physical effects and nutrition consideration. Guidelines for promoting healthful eating in old age, Exercise in old age.	**12**
Total		**48**
Pedagogy: Lectures, Assignments, Seminars		

Text Books:

1. Gordon. M. Wardlaw et.al; Contemporary Nutrition, 2nd edition, Publishing by Mosby, 2004.
2. Srilakshmi. B; Dietetics, 7th edition,New Age International (P) Limited Publishers, 2014.

Reference Books:

1. William's Nix; Basic Nutrition and Diet therapy, 14th edition, Published by Mosby, 2013.
2. MahtabS.Bamji, Prasad Rao, N.Vinodini Reddy; Textbook of Human Nutrition, Second Edition Oxford and IBH Publishing Co. Pvt .Ltd, 2003.
3. Nutrient Requirement and Recommend Dietary Allowances for Indians by Indian council of Medical research, National Institute of nutrition, Hyderabad.

Subject Name: Advances in Nutritional Biochemistry	**Scheme of Evaluation: (T)**
Subject Code: NDC154C102	**Credit Units: 3-1-0-4**

Course Objective: The course is designed with the following major objectives

To understand the structure, functions, effects of deficiency and excess of macronutrients in human body.

Course Outcomes:

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Remember** the functions of macronutrients in human body	**BT 1**
CO 2	**Understanding** the different types of micronutrients, significance & health benefits	**BT 2**
CO 3	**Apply** the knowledge of macronutrients	**BT 3**
CO 4	**Analyse** the different food processing techniques, novel food processing, their parameters, advantages and disadvantages	**BT 4**
CO 5	**Evaluate** the different status during life cycle with deficiency & excess	**BT 5**

Detailed Syllabus:

Modules	Topics / Course content	Periods
I	**Water & electrolytes:** Fluid comportments, distribution, water Intake & output, water balance, Composition of electrolytes in fluid compartments, buffer system, acid base balance-blood & kidney, imbalance disorders-dehydration & oedema. Enzymes – Classification and Role of Enzymes. **Carbohydrate metabolism:** Classification, Review of digestion and absorption. oxidation of glucose – glycolysis, oxidative decarboxylation, citric acid cycle. Pentose phosphate pathway. Glycogen- Glycogenesis, Glycogenolysis. Gluconeogenesis. Inborn errors of metabolism. Glycogen storage diseases.	**12**
II	**Protein metabolism:** Classification of protein, Review of digestion and absorption. Deamination, transamination, trans-deamination, decarboxyalation, deamidation, Urea cycle, inborn errors of amino acid metabolism.	**12**
III	**Nucleic acid metabolism**: Classification, Biological oxidation, Electron transport chain, nucleic acid metabolism, structure of DNA & RNA, genetic code, DNA replication, bio synthesis of protein.	**12**
IV	**Lipid metabolism**: Classification, Oxidation of fatty acid- α , β, & ω. Bio synthesis of fatty acid & TGL, Cholesterol synthesis & synthesis of bile acids & bile pigments, ketosis, ketone bodies, acidosis & fatty liver.	**12**
Total		**48**
Pedagogy: Lectures, Assignments, Seminars		

Text Books:

1. U.Sathyanarayana and U.Chakrabani, Biochemistry, Third Edition, Uppala- Author Publishers, 2007.
2. Mahtab. S.Bamji, Kamala Krishnaswamy and G.N.V Brahmam, Text Book of Human Nutrition, Oxford and IBH Publishing Company, Third Edition.2009

Reference Books:

1. Deb. A.C., Fundamental of Biochemistry, New Centruy Book Agency (P) Ltd, Reprint 2004.
2. Srilakshmi.B; Nutrition Science, 15thedition, New Age International (P) Limited, Publishers, 2016.
3. Swaminathan. M; Advanced Text-Book on Food and Nutrition, Volume I 2ndedition. The Bangalore Printing and Publishing Co., LTD, Reprint 2015.

Subject Name: Advances in Human Nutrition & Metabolism	Scheme of Evaluation: (T)
Subject Code: NDC154C103	Credit Units: 3-1-0-4

Course Objective:

To understand the functions, sources deficiency and excess of macro & micronutrients

Course outcomes:

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Remember** the functions of different nutrients and health benefits	**BT 1**
CO 2	**Understand** the effect of various deficiency diseases and excess on health status	**BT 2**
CO 3	**Apply** knowledge in nutritional planning using different food sources	**BT 3**
CO 4	**Analyse** the role of different food constituents in protecting human health	**BT 4**
CO 5	**Evaluate** the quality of foods in relation to human health	**BT 5**

Detailed Syllabus:

Modules	Topics / Course content	Periods
I	**Carbohydrates** – Introduction, Classification - Basis of degree of polymerization, based on digestive fate of carbohydrates. Functions, Food sources, Requirements. Digestion, absorption and metabolic utilization of carbohydrates, Regulation of blood glucose concentration. Glycemic index -Factors affecting GI of foods. **Dietary fibre**-Introduction, Types, Properties, RDA and Components of dietary fibre. Role of fibre in human nutrition.	**12**
II	**Lipid**-Introduction, Classification, Function, Food sources, Requirements, RDA, digestion, absorption, transport and storage. Lipids and gene expression. Dietary fat and coronary heart disease. Fatty acid- Types, Functions, Requirements, food sources and deficiency. **Omega fatty acids** – Classification, role in good health, daily values, food sources, fortification of omega fatty acids. **Proteins-** Introduction, Classification, Functions, Requirements and RDA, Food sources, Digestion, absorption and metabolic utilization of protein, Quality of proteins. **Amino acid** - Types, functions, food sources, requirements, deficiency. Therapeutic applications of specific amino acids. Peptides of physiological significance. Proteins, amino acids and gene expression.	**12**
III	**Energy** – Introduction, Units, determination of energy value of food, physiological fuel value, Benedict's Oxy-calorimeter, relation between oxygen required and calorimeter value. Basal Metabolic rate – Introduction, measurement of basal metabolism determination of basal	**12**

	metabolic rate by calculation energy requirement, during work, Thermic effect of food, Total energy requirement – Meaning, Measuring total energy requirement. Factors affecting physical activity, basal metabolic rate and thermic effect of food, Dietary source, RDA.	
IV	**Fat soluble Vitamins:** Introduction, functions, digestion, absorption, transport, storage, bioavailability, requirements, food sources, deficiency and toxicity. Interactions with other nutrients. **Water soluble Vitamins :**Thiamin, Riboflavin, Niacin, Pyridoxine, Folic acid, Vitamin- B12, Biotin, Pantothenic acid, Vitamin-C- Introduction, functions, absorption, transport, storage, bioavailability, requirements, food **Major minerals:** Calcium, Phosphorus and Magnesium - Introduction, functions, absorption, transport, storage, bioavailability, requirements, food sources, deficiency and toxicity. Interactions with other nutrients. **Electrolytes**: Sodium, Potassium and Chloride- Sources, functions, deficiency and toxicity.**Trace Minerals:** Iron, Copper, Fluride, Selenium, Manganese, Zinc, Iodine-Introduction, functions, absorption, transport, storage, bioavailability, requirements, food sources, deficiency and toxicity. Interactions with other nutrients.Sources, deficiency and toxicity. Interactions with other nutrients.	**12**
Total		**48**
Pedagogy: Lectures, Assignments, Seminars		

Textbooks:

1. Michael. J. Gibney etal; Clinical Nutrition Black well Science, 2005.
2. Shubhangini. A. Joshi; Nutrition and Dietetics, 3rd edition, McGraw Hill Education (India) Private Limited.

Reference Books:

1. Swaminathan. M; Advanced Text-Book on Food and Nutrition, Volume I and 11 2nd Edition, The Bangalore printing and publishing co., LTD, Reprint 2015.
2. SunetraRoday; Food Science and Nutrition, 2nd edition, Oxford University press, 2013.
3. Carol Byrd – Bredbenner; Wardlaw's perspectives in Nutrition, 9th edition McGraw – Hill International Edition, 2013.

Subject Name: Research Methodology	**Scheme of Evaluation:(T)**
Subject Code: NDC154C104	**Credit Units: 3-1-0-4**

Course Objective: The course aims to give a holistic knowledge with the principles and methods of scientific research and to familiarize students with statistical methods for data analysis

Course Outcomes:

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Remember** the steps and sampling methods of research design and various methods of data design.	**BT 1**
CO 2	**Understand** the graphical representation of research methods and scientific report writing	**BT 2**
CO 3	**Apply** knowledge about probability and distribution factors.	**BT 3**
CO 4	**Analyse** the measures of central tendency (mean, mode)for grouped and ungrouped data.	**BT 4**
CO 5	**Evaluate** the measures of sigma scores, standard scores ,percentiles and calculation and interpretation of statistical procedures.	**BT 5**

Detailed Syllabus:

Modules	**Topics / Course content**	**Periods**
I	**Introduction to research** :Significance, Purpose and Types of Research , Ethics in Research, Plagiarism , Research Design – steps ,Sampling Methods and Scaling Techniques , Research Tools and Methodology of Data Collection , Databases in Food Research	**12**
II	**Research data presentation** : Variables in Research and Scales of Measurement , Tabulation of Research Data ,Graphical Presentation of Data – use of Excel and Statistical Software , Scientific Report Writing	**12**
III	**Related research concepts :**Probability – Theoretical and Conditional ,Gaussian Curve ,Binomial Distribution , Poisson Distribution , Density Functions , Vital Statistics and Life Tables	**12**
IV	**Descriptive statistics** :Measures of Central Tendency – Mean, Mode, and Mode for Grouped and Ungrouped Data ,Measures of Variability – Range, Variance, Standard Deviation and Standard Error , Measures of Relative Positions - Sigma Scores, Standard Scores, Percentiles, Percentile Ranks , Measures of Relationships – Correlation and Regression Analysis , Measures of Shape – Skewness, Kurtosis , Calculations and Interpretation of Statistical Procedures	**12**
Total		**48**
Pedagogy: Lectures, Assignments, Seminars		

Text Books:

1. Jackson SL. 2012. Research Methods and Statistics: A Critical Thinking Approach. Fourth Edition. Wadsworth Cengage Learning.
2. Krishnan V. Statistics for Beginners. Atlantic Publishers and Distributors (P) Ltd

Reference Books:

1. Shabbir S. Food Borne Diseases. Humana Press.
2. Stephen AM. (Ed.). Food Polysaccharides and Their Applications. Marcel Dekker.

Subject Name: Food Science	**Scheme of Evaluation: (T)**
Subject Code: NDC154C105	**Credit Units: 3-1-0-4**

Course Objective: The course is designed with an objective to give students knowledge on the science behind different food groups & also to learn about the effects of processing in nutritional composition of different foods.

Course Outcomes:

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Remember** the significance and functions of foods from different food groups and their various types ,compositions of materials and their usage for different food products	**BT 1**
CO 2	**Understand** the physical & chemical properties of foods and changes that occur due to processing.	**BT 2**
CO 3	**Apply** knowledge about the functions of foods in product development	**BT 3**
CO 4	**Analyse** the factors affecting the functional & structural changes of foods due to processing	**BT 4**
CO 5	**Evaluate** the quality of foods before and after processing	**BT 5**

Detailed Syllabus:

Modules	**Topics / Course content**	**Periods**
I	Definition of Food Science, Food, **Colloids** – Types and Properties; Sols – Properties; Gels – Properties and factors influencing gel formation; Emulsion – Types, formation, properties and stability of emulsions; Foams – formation, Stability and anti-foaming agents. **Cereals:** General structure, composition, Nutritive value of rice, wheat, maize, oats and jowar. Cereal cookery: Cereal protein- Gluten formation and factors affecting; Cereal starch, effect of moist heat – Gelatinisation, factors affecting gelatinisation Changes in cooked starches- Gel formation, Retrogradation and syneresis; Effect of dry heat- Dextrinisation; Effect of cooking on nutritive value. **Millets:** Composition, Nutritive value and uses of pearl millet, finger millet, proso millet.	**12**

II	**Pluses:** Composition and nutritive value, Digestibility of pulses and factors affecting the digestibility of pulse proteins, Toxic constituents in pulses and their elimination; commonly used pulses. Pulse cookery: Effect of cooking, Factors affecting cooking quality.**Nuts and Oilseeds:** Classification, composition and nutritive value, toxins present in nuts, role in cookery. Fats and oils: Nutritional importance of fats and oils, functions of oils and fats in foods, flavour changes – Rancidity – types and prevention, reversion.	**12**
III	**Milk and Milk products:** Composition of milk, Nutritive value of milk and milk products, Physical and chemical properties of milk, Types of milk available in the market.Meat: Classes of meat, structure, composition and nutritive value; post-mortem changes in meat, ageing, tenderising, curing; cuts and grades of meat. Meat cookery: Factors affecting cooking quality, changes in meat on cooking, tenderness and juiciness of meat. **Fish:** Classification, composition and nutritive value, selection. Fish cookery: Principles and methods. **Poultry:** Classification, composition and nutritive value, processing and cooking. **Egg:** Structure, composition and nutritive value, quality of egg – factors determining and evaluation. Egg cookery: Effect of cooking on nutritive value, effect of heat on egg protein, factors affecting coagulation of egg proteins, effect of other ingredients on egg proteins.	**12**
IV	**Vegetables:** Classification, composition and nutritive value, pigments, organic acids, enzymes, flavour compounds, bitter compounds, selection of vegetables. Vegetables cookery: Changes during cooking, loss of nutrients during cooking, effect of cooking on pigments. **Fruits:** Classification, composition and nutritive value, pigments, cellulose and pectic substances, changes during cooking, flavour constituents, polyphenols, bitterness, post-harvest changes and ripening. Browning: Types and prevention **Sugar:** Sources, properties, types, forms, liquid sweeteners, reactions of sugar Crystallisation: Factors affecting, role of sugar in cookery, stages of sugar cookery, crystalline and non-crystalline candies. **Spices:** Classification, general functions, commonly used spices and herbs, role of spices in cookery.	**12**
Total		**48**
Pedagogy: Lectures, Assignments, Seminars		

Text Books:

1. Srilakshmi. B; Food Science, 6th edition New Age International (p) Limited Publishers 2015.
2. Shakunthalamanay N; Shadakshara swamy. M; Foods Facts and Principles, Third edition, New Age International (p) Limited Publishers, 2014.

Reference Books:

1.Arindam Ramaswamy, Elements of Food Science, Oxford book company, 2010.

2.Norman N. Potter, Joseph H. Hotehkiss, and food science, fifth edition, CBS publishers and distributors, 1996.

Subject Name: Practical I : Laboratory Techniques	Scheme of Evaluation: (P)
Subject Code: NDC154C116	Credit Units: 0-0-8-4

Course Objective:

The course is designed with an objective to give the students a practical skills required to work in an analytical laboratory.

Course Outcomes:

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Remember** the practical skills associated with handling different apparatus used in chemical analysis	**BT 1**
CO 2	**Understand** the basic principles, biochemical reactions and processes	**BT 2**
CO 3	**Apply** the knowledge gained during the course in the field of research and development.	**BT 3**
CO 4	**Analyse** theoretical knowledge in developing practical solutions to determine food constituents	**BT 4**
CO 5	**Create** an understanding in expanding the future prospects of pursuing as analysts in laboratory	**BT 5**

Detailed Syllabus:

Modules	Topics / Course content	Periods
I	Familiarising with basic instruments/equipment used in biochemical laboratories. Safety measures to be followed while working in biochemical laboratory. Basic calculations of preparing buffer solutions, normal solutions, molar solutions, percent solutions etc.	**24**
II	Proximate composition of foods and products: Estimations of moisture, total minerals, fibre, fat, protein, carbohydrate and energy	**24**
III	Estimation of vitamin c, iron by titrimetric method/colorimetric method. Basics of chromate graphic methods.	**24**
IV	Estimations of selected vitamins and minerals, bioactive compounds in terms of phenols, flavonoids, anti oxidant capacity	**24**
Total		**96**
Pedagogy: Lectures, Experiments, Laboratory sessions		

Texts books:

1) A Manual of Laboratory Techniques. Eds. N. Raghuramulu, K Madhavan Nair, S Kalyansundaram, 1983.National Institute of Nutrition, ICMA, Hyderabad,
2) S. Ranganna (2011) Handbook of Analysis and Quality Control for Fruits & Vegetable Products. Tata McGraw - Hill Publishing Company Ltd. New Delhi.

Reference book :

1) Y. Pomeranz, C.E Meloan (2000) Food Analysis Theory & Practice. Springer

SYLLABUS (2nd SEMESTER)

Subject Name: Physiological Aspects of Nutrition	**Scheme of Evaluation: (T)**
Subject Code: NDC154C201	**Credit Units: 3-1-0-4**

Course Objective:

The course aims to give an advance knowledge to the students on human physiology and understanding the integrated functions of all systems and the grounding of nutritional science in physiology.

Course Outcome:

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Remember** the human physiological systems	**BT 1**
CO 2	**Understand** the structures and functions of the of human physiological system	**BT 2**
CO 3	**Apply** the knowledge gained in physiology to nutrition and health	**BT 3**
CO 4	**Analyse** the role of the different parts of the systems and also the role of enzymes and hormones	**BT 4**
CO 5	**Evaluate** the relation between physiology and nutrition	**BT 5**

Detailed Syllabus:

Modules	**Topics / Course content**	**Periods**
I	**Digestive system**: Structure and functions of gastrointestinal tract and gastrointestinal secretions. Role of enzymes in digestion and role of prebiotics and probiotics in the maintenance of health of digestive system. Regulation of food intake –hunger, appetite and satiety. Liver: Structure and functions of liver.	**12**
II	**Respiratory system:** Structure of lungs and gaseous exchange (transport of oxygen and carbon-di-oxide). **Nervous system:** Structure and functions of brain (briefly) and spinal cord; structure and functions of neuron; conduction of nerve impulse, role of neuro	**12**

	transmitters; blood brain barriers, CSF, hypothalamus and its role in various body functions. Musculo- skeletal system: Structure and functions of bone; physiology of muscle contraction. **Cardio vascular system:** Blood composition and functions, structure and function of heart and blood vessels, regulation of cardiac output and blood pressure, heart failure and hypertension. Excretory system: Structure and functions of kidney, structure of nephron, physiology of urine formation, micturition.	
III	**Endocrine system:** Structure, function, role of hormones, regulation of hormone secretion and disorders – pituitary, thyroid, adrenal, pancreas and parathyroid glands. Functions and deficiency of insulin.	**12**
IV	**Reproductive system:** Ovaries- Structure of ovaries, functions of oestrogens and progesterone. Function of Uterus, Hormonal control of menstrual cycle, physiological changes in pregnancy, parturition, lactation and menopause. Testes: Structure of Testes, functions of testosterone, deficiency of testosterone.	**12**
Total		**48**
Pedagogy: Lectures, Assignments, Seminars		

Text Books:

1. Ganongs. W.F; Review of medical physiology, 1985.
2. Campbell. E.J et al; Clinical and applied physiology,1984.

Reference Books:

1. Guyton AC and Hall JB; Textbook of medical physiology, 1996.
2. Guyton AC; Functions of human body, 1985.

Subject Name: Advances in Therapeutic Nutrition I	**Scheme of Evaluation: (T)**
Subject Code: NDC154C202	**Credit Units: 2-1-0-3**

Course Objective:

To understand the etiology, physiological, metabolic anomalies, nutritional management of acute and chronic disorders / diseases

Course outcomes:

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Remember** the factors to consider in dietary management in certain diseased conditions	**BT 1**

CO 2	**Understand** the effect of various disorders / diseases on nutritional status, nutritional and dietary requirements	**BT 2**
CO 3	**Apply** knowledge in dietary management through dietary modification and adaptations in diseases state.	**BT 3**
CO 4	**Analyse** the different diet related situations in diseased conditions.	**BT 4**
CO 5	**Evaluate** the various disorders / diseases on nutritional status, and their dietary & nutritional	**BT 5**

Detailed Syllabus:

Modules	Topics / Course content	Periods
I	**Introduction to medical nutrition therapy-** Introduction, Role of dietician in health care. **Nutrition care process:** Nutritional Assessment, Nutritional Diagnosis, Nutritional Intervention, Nutritional Monitoring and Evaluation.	**12**
II	**Patient Care and Counseling**. **Adaptation of therapeutic diets:** Introduction to therapeutic diets, Types of dietary adaptation for therapeutic needs, Normal nutrition- a base of therapeutic diet, Diet prescription and constructing therapeutic diets **Routine Hospital Diets:** Normal or general diets, Liquid diets, soft diets. **Mode of Feeding:** Oral feeding, tube or enteral feeding, Peripheral vein feeding, Total parenteral nutrition.	**12**
III	**Nutritional care in weight management:** Introduction, underweight, overweight and obesity. **Nutritional management in infections and fever:** Typhoid, Pneumonia and Tuberculosis. **Nutritional management in food allergies and food intolerance.**	**12**
IV	**Nutritional management in gastro intestinal diseases:** Diarrhoea, 10 Constipation, Gastritis, Peptic Ulcer. **Malabsorption Syndrome**- Celiac disease, Steatorrhoea, Lactose Intolerance, Tropical spruce, Crohns disease, Irritable bowel disease.	**12**
Total		**48**
Pedagogy: Lectures, Assignments, Seminars		

Text Books:

1. Michael. J. Gibney *et al;* Clinical Nutrition Blackwell Science, 2005.
2. Shubhangini. A. Joshi; Nutrition and Dietetics, 3rd edition, McGraw Hill Education (India) Private Limited.

Reference Books:

1. Swaminathan. M; Advanced Text-Book on Food and Nutrition, Volume I and 11 2nd Edition, The Bangalore printing and publishing co., LTD, Reprint 2015.
2. SunetraRoday; Food Science and Nutrition, 2nd edition, Oxford University press, 2013.
3. Carol Byrd – Bredbenner; Wardlaw's perspectives in Nutrition, 9th edition McGraw – Hill International Edition, 2013.

Subject Name: Scientific Writing Skills	**Scheme of Evaluation: (T)**
Subject Code: NDC154C203	**Credit Units: 2-1-0-3**

Course Objective:

This course aims to develop students' ability to write scientific papers, reports, and other professional documents. The focus will be on the principles of clear and concise scientific writing, understanding the structure of scientific papers, and developing skills for effective communication in the field of food and nutrition.

Course Outcomes:

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Remember** the effective methods for presenting data and research findings.	**BT 1**
CO 2	**Understand** the ethical considerations in scientific writing.	**BT 2**
CO 3	**Apply** the structure and elements of scientific papers.	**BT 3**
CO 4	**Analyse** the different types of scientific documents and practise them	**BT 4**
CO 5	**Evaluate** the skills for writing clear and concise scientific texts.	**BT 5**

Detailed Syllabus:

Modules	**Topics / Course content**	**Periods**
I	**Scientific Writing** : Importance of Scientific Writing in Food and Nutrition; Role of scientific writing in research industry, and public health communication, different types of scientific documents (research papers, review articles, reports, etc.); **The Writing Process** - Planning and organizing scientific papers. - Understanding the target audience and the purpose of scientific communication	**24**
II	**Structure and components of scientific papers** :Overview of research paper structure - key components: title, abstract, introduction, methods, results, discussion, and references**; writing the introduction and literature review** - crafting a compelling introduction; conducting a literature review: finding, summarizing, and synthesizing relevant research.	**24**
III	**Methods, results, discussion and conclusion**: Describing research methods - writing clear and detailed methodology sections. - importance of reproducibility and transparency; presenting results - effective use of tables, figures, and graphs; describing statistical analyses and interpreting data; crafting the discussion section - interpreting and discussing research findings; Discussing the significance, limitations, and future directions of the study; writing the conclusion and abstract - summarizing the main findings and contributions of the study. - crafting an abstract that succinctly summarizes the study's purpose, methods, results and conclusions.	**24**

IV	**Ethics and integrity in scientific writing**: Ethical considerations - understanding plagiarism, authorship, and conflicts of interest; ethical data handling and reporting; peer review and publication process - the role of peer review in scientific publishing - how to respond to reviewer comments and revise manuscripts. **Specialized writing and communication** : Writing research proposals and grant applications - key elements of research proposals and grants; strategies for successful grant writing; writing for lay audiences and media - adapting scientific information for non-expert audiences. – communicating science through media and public platforms.	**24**
		64
Pedagogy: Lectures, Experiments, Laboratory sessions		

Text books

1. Hofmann, A. H. (2019) Scientific writing and communication: Papers, proposals, and presentations (4th ed.). Oxford University Press.
2. Silyn-Roberts, H. (2012) Writing for science and engineering: Papers, presentations and reports (2nd ed.) Butterworth-Heinemann.

Reference Books:

1. Alley, M. (2018). The craft of scientific writing* (4th ed.). Springer.
2. Peat, J., Elliott, E., Baur, L., & Keena, V. (2013). Scientific writing: Easy when you know how (2nd ed.). BMJ Books.

Subject Name: Food Processing & Preservation	**Scheme of Evaluation:(T)**
Subject Code: NDC154C204	**Credit Units: 2-1-0-3**

Course objectives: The course is designed to acquaint students with different types of processing techniques commonly used to process fruits and vegetables to make it consumable

Course outcomes:

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Remember** the types, varieties, classification process of foods and their by-products utilizations	**BT 1**
CO 2	**Understand** the classification and composition of foods	**BT 2**
CO 3	**Apply** knowledge about food processing to formulate products/new products	**BT 3**
CO 4	**Analyse** the classification of minor and major fruits, lesser known fruits and vegetables and its nutritional importance.	**BT 4**
CO 5	**Evaluate** the market scenario of different food products.	**BT 5**

Detailed syllabus:

Modules	Topics / Course content	Periods
I	**Malted Beverage Processing:** Types of malted beverages : Beer, Whiskey, Malted milk, Other variations**,** Raw Materials, Malting Process, Milling and Mashing, Wort Production, Fermentation, Post-Fermentation Processing**,** Quality control, Equipment and Technology, Regulations and Standards. **Fruits and vegetable technology:** Dehydration, juice concentrate, canning of fruits and vegetables.	**12**
II	**Dairy technology:** Milk processing: Separation, standardization, pasteurization, homogenization, sterilization, evaporation, drying. Manufacturing of cheese, butter, khoa, yoghurt, srikhand, ice cream, condensed milk and dry milk. Byproducts: Skimmed milk, lassi, butter milk, whey, ghee residue. **Fleshy food technology:** Processing of fish for smoking, canning and freezing. Curing of meat, Poultry processing, Pasteurization of egg, manufacture of egg powder and frozen egg products.	**12**
III	**Preservation by use of High temperatures-** Factors affecting heat resistance, heat resistance of microorganism and their spores, determination of heat resistance, thermal-death-time curves, heat penetration, determination of thermal processes, heat treatments employed in processing foods. **Preservation by use of low temperatures-** Low-temperature methods-Refrigeration, cool storage and freezing. Low- temperature-Microbial activity, characteristics, factors affecting the quality of foods and packaging requirements for foods.	**12**
IV	**Preservation by drying and dehydration-** Methods, advantages and disadvantages. Factors in the control of drying, treatments of food before drying, procedures after drying, microbiology of dried foods. **Food irradiation-** Introduction, electromagnetic energy, ionizing radiation, kinds of ionizing radiation and their applicability on food processing, effects of food irradiation, safety of irradiated foods.	**12**
Total		**48**

Text Books:

1. Srilakshmi. B; Food Science, 6thedition, New Age International (P) Limited Publishers, 2015.

2. ShakunthalaManay. N; ShadaksharaSwamy.M; Foods Facts and Principles, 3rdedition, New Age International (P) Limited Publishers, 2014.

1. .Lillian Hoagland Meyer, Food chemistry, CBS Publishers and Distributors, 2004.
2. Subbulakshmi. G and Shobha. A.U; Food processing and preservation, New Age International (P) Limited Publishers, 2014.

Reference books:

1.Norman. N Potter, Joseph H. Hotchkiss, Food Science, 5th edition, CBS Publishers and Distributors, 1996.

2.Sivasankar. B; Food Processing and Preservation, PHI Learning Private Limited, 2011.

Subject Name: Practical II : Normal and Therapeutic Diets	**Scheme of Evaluation: (P)**
Subject Code: NDC154C215	**Credit Units: 0-0-6-3**

Course Objective:

The course is designed with an objective to give the students a practical knowledge on planning diet in different health conditions

Course Outcomes:

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Remember** the methodological details to plan meals in different conditions	**BT 1**
CO 2	**Understand** the methods involved in planning modified diet in different health conditions	**BT 2**
CO 3	**Apply** the knowledge on nutrient compositions of foods in diet planning in normal and diseased conditions.	**BT 3**
CO 4	**Analyse** the compositional variations in foods to apply in meal planning	**BT 4**
CO 5	**Evaluate** the variations in meal planning as per the state of health	**BT 5**

Detailed Syllabus:

Modules	**Topics / Course content**	**Periods**
I	**Introduction to medical nutrition therapy-** Introduction, Role of dietician in health care. **Nutrition care process:** Different tools of assessment, Nutritional Assessment, Nutritional Diagnosis, Nutritional Intervention, Nutritional Monitoring and Evaluation. **Patient Care and Counseling**.	**24**
II	**Adaptation of therapeutic diets:** Introduction to therapeutic diets, Types of dietary adaptation for therapeutic needs, Normal nutrition- a base of therapeutic diet, Diet prescription and constructing therapeutic diets **Routine Hospital Diets:** Normal or general diets, Liquid diets, soft diets. **Mode of Feeding:** Oral feeding, tube or enteral feeding, Peripheral vein feeding, Total parenteral nutrition.	**24**
III	**Nutritional care in weight management:** Introduction, underweight, overweight and obesity **Nutritional management in infections and fever:** Typhoid, Pneumonia and Tuberculosis. **Nutritional management in food allergies and food**	**24**

	intolerance.	
IV	**Nutritional management in cardiovascular diseases:** Dyslipidemia, Atherosclerosis, Hypertension, Myocardial Infarction, Angina Pectoris, Chronic Heart Failure, Rheumatic heart disease, Stroke. **Nutritional management in gastro intestinal diseases:** Diarrhoea, 10Constipation, Gastritis, Peptic Ulcer. **Malabsorption Syndrome**- Celiac disease, Steatorrhoea, Lactose Intolerance, Tropical spruce, Crohns disease, Irritable bowel disease.	**24**
		64
Pedagogy: Lectures, Experiments, Laboratory sessions		

Text books:

3. **Joshi, S.A., Nutrition and Dietetics,** Tata McGraw Hill Publications, New Delhi, 2004. **2. Srilakshmi B.,** Dietetics, New Age International (P) limited Publications, 2004
4. Amy E. Galena, Msh Rd. 2013. Eat to Your Good Health: Exchange Lists and Meal Planning for Eating Disorders. USA

Reference books:

1. Peggy S. Stanfield, Peggy Stanfield, Y. H. Hui. 2010. Nutrition and Diet Therapy: Self-Instructional Approaches. 5th edition. Jones and Bartlett publishers. Canada.
2. B Srilakshmi. 2014. Dietetics. New Age International publishers.

SYLLABUS (3rd SEMESTER)

Subject Name: Community and Public Health Nutrition	**Scheme of Evaluation: (T)**
Subject Code: NDC154C301	**Credit Units: 2-1-0-3**

Course objectives: The course is designed to acquaint students with understanding of nutrition and health in community and public health sectors and learn about the importance of child and maternal health.

Course outcomes:

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Remember** the types, varieties, classification process of assessment of health in community and public areas.	**BT 1**
CO 2	**Understand** the different aspects of community health	**BT 2**
CO 3	**Apply the** knowledge of nutrition science to human health across a life span.	**BT 3**
CO 4	**Analyse** the nutritional parameters for healthy lifestyle in communities.	**BT 4**
CO 5	**Evaluate** the importance of health programmes, policies related to maternal and child health.	**BT 5**

Detailed syllabus:

Modules	Topics / Course content	Periods
I	**Concept of Public Health Nutrition:** Understanding the terms, nutrition, health, healthcare, Role of public health nutrition in community, Public health nutrition- multidisciplinary concept **Nutritional problems: Protein Energy Malnutrition (PEM)-** Prevalence, causes, consequences, threat and prevention, Micronutrient deficiencies: vitamin A, iron, iodine, zinc, Other important vitamin deficiencies: Flourosis, lathyrism, etc.	**12**
II	**Economics of food security:** Methods of nutritional assessment (Direct and Indirect methods), Anthropometric assessment, Biochemical assessment, Clinical assessment, Dietary assessment	**12**
III	**Nutrition monitoring and surveillance:** Objectives and components, Recent programmes, Nutrition surveillance system, Nutrition policies and programmes, National nutrition programmes (ICDS), Supplementary feeding programmes, nutrition deficiency control programmes, food security programmes	**12**
IV	**Strategies to combat public health nutrition problems:** food based strategies, dietary diversification, food fortification, and nutrition and hea.th education. **Medical approach to combat public health nutrition problems:** immunization, implementation of nutritional education programmes, identifying the target audience, designing messages, choosing medium multimedia, development of communication strategy.	**12**
Total		**48**

Text Books:

Wadhwa, Arvind Chadha, Ravindere Vijayaraghavan, ,k. Pandav, C.S. Sharema, Sushma kapil, Umesh Gopaldas, Tarra Mehan, Meenakshi kanani, Shubhada kapure, Deeksha, Text Book of Public Nutrition, IGNOU, New Delhi, 2013.

Reference books:

1. Suryatapa Das, Textbook of Community Nutrition, Four Edition, Academic Publisher
2. Seghal, 8 & Raghuvardhi, Textbook of Community Nutrition, Fourth Edition, Indian Council of Agriculture Research, Pusa, 2000.

Subject Name: Advances in Therapeutics Nutrition II	**Scheme of Evaluation: (T)**
Subject Code: NDC154C302	**Credit Units: 2-1-0-3**

Course Objective:

To understand the etiology, physiological, metabolic anomalies, nutritional management of acute and chronic disorders / diseases

Course outcomes:

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Remember** the factors to consider in dietary management in certain diseased conditions	**BT 1**
CO 2	**Understand** the effect of various disorders / diseases on nutritional status, nutritional and dietary requirements	**BT 2**
CO 3	**Apply** knowledge in dietary management through dietary modification and adaptations in diseases state.	**BT 3**
CO 4	**Analyse** the different diet related situations in diseased conditions.	**BT 4**
CO 5	**Evaluate** the various disorders / diseases on nutritional status, and their dietary & nutritional	**BT 5**

Detailed syllabus:

Modules	Topics / Course content	Periods
I	**Introduction to non- communicable diseases:** Diabetes Mellitus, coronary heart diseases, renal diseases, cancer. **Nutritional management in diabetes mellitus (DM):** prevalence, classification and etiology, factors affecting normal blood sugar levels, metabolic aberrations and symptoms, diagnosis, complications, management of DM, exercise and drugs, education, prevention.	**09**
II	**Nutritional management in coronary heart diseases (CHD):** prevalence, etiology: cardiovascular risk factors, pathophysiology of CHD**.** **Common disorders of CHD and their management:** dyslipidemia, atherosclerosis, hypertension, angina pectoris, myocardial infections, congestive cardiac failure, rheumatic heart disease. **Nutritional management in renal diseases (RD):** physiology of kidney, assessment of kidney function, common renal diseases. **Common disorders of RD and their management:** acute and chronic nephritis, nephrotic syndrome, acute renal failure, chronic renal failure, end stage renal disease, renal calculi, commonly available commercial enteral nutrition formulas for renal patients.	**09**
III	**Nutritional management in cancer:** development, characteristics and identification of cancer cells, etiological risk factors in cancer, metabolic alterations and the resultant nutritional problems, clinical manifestations associated with cancer, nutritional requirements of cancer patients, dietary management of cancer patients and feeding problems related cancer therapy, prevention. **Nutritional management in neurological disorders:** common neurological disorders, physiological aspects of the CNS, feeding and nutritional issues, dysphagia, alzheimers, Parkinson, epilepsy, neurotrauma, spinal trauma.	**09**
IV	**Nutrition in stress, burns and surgery:** introduction, nutritional requirement during stress, degree of burns (1^{st}, 2^{nd} and 3^{rd}), diet , nutritional assessment, complications, nutritional care of patients with burns, principles of diet therapy, accidental injury- nutritional care and	**09**

	nutrition needed, surgery- nutrients needed, post- operative diet. **Nutrient drug interaction:** introduction, nutrient and drug absorption, effect of drug on food intake, nutrient metabolism, precautions to be taken.	
Total		**36**

Text Books:

1. Michael. J. Gibney etal; Clinical Nutrition Blackwell Science, 2005.
2. Shubhangini. A. Joshi; Nutrition and Dietetics, 3rd edition, McGraw Hill Education (India) Private Limited.

Reference Books:

1. Swaminathan. M; Advanced Text-Book on Food and Nutrition, Volume I and 11 2nd Edition, The Bangalore printing and publishing co., LTD, Reprint 2015.
2. SunetraRoday; Food Science and Nutrition, 2nd edition, Oxford University press, 2013.
3. Carol Byrd – Bredbenner; Wardlaw's perspectives in Nutrition, 9th edition McGraw – Hill International Edition, 2013.

Subject Name: Nutrition for critically ill patients	**Scheme of Evaluation: (T)**
Subject Code: NDC154C303	**Credit Units: 2-1-0-3**

Course Objective:

Understand and identify the high-risk patients requiring specialized nutritional support.

Course Outcome:

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Remember** the physiology, metabolism and special requirements of the critically ill patients.	**BT 1**
CO 2	**Understand** the special nutritional support techniques and feeding formulations to meet nutritional needs of critically ill patients	**BT 2**
CO 3	**Apply** knowledge for developing cost-effective nutritional support strategies.	**BT 3**
CO 4	**Analyse** and manage feeding-related complications.	**BT 4**
CO 5	**Evaluate** the current nutritional guidelines and practices.	**BT 5**

Detailed syllabus:

Modules	**Topics / Course content**	**Periods**

I	**Nutritional support systems and other life – saving measures for the critically ill patients:** Enteral and parenteral nutrition support. Role of immune enhancers, conditionally essential nutrients, immune suppressants, and special diets in critical care.	**10**
II	**Enteral Nutrition :** Various sites for enteral nutrition, Ryle's tube and its care, types of feeds, advantages and disadvantage of home-based feeds, Commercial formula feeds, Incorporation of easily digestible foods, Requirements of nutrients according to problems eg. Renal, respiratory etc.	**12**
III	**Total Parental Nutrition:** The importance of TPN, Long term effect of its use, site of TPN and its care, composition	**12**
IV	Diet related ethical issues in the terminally ill. Nutritional Support System and Complications including refeeding syndrome and rehabilitation diets.	**14**
Total		**48**

Text books:

1. Janice L Raymond, MS, RDN, CSG and Kelly Morrow, MS, RDN, FAND (2023): Krause's Food Nutrition and Diet Therapy, 16th Edition, W.B. Saunders Ltd.

2. Rajendram, R., Preddy, V.R., Patel, V.B. (2015): Diet and Nutrition in Critical Care, Volume 2, Springer-Verlag New York Inc.

Reference Books:

1. Dixit, S., Zirpe, K., Khatib, K., Joshi, A., Kulkarni, S. (2017): Principles in Critical Care Nutrition (ICSSM), 1st edition, Jaypee Brothers Medical Publishers

2. Faber, P., Siervo, M. (2014): Nutrition in Critical Care, 1st edition, Cambridge University Press

Subject Name: Institutional Food Service Management	**Scheme of Evaluation: (T)**
Subject Code: NDC154C304	**Credit Units: 3-1-0-4**

Course Objective:

Understand key concepts of creating, managing, and running a foodservice business, from concept to operation.

Course Outcome:

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Remember** the significance of food and beverage as it relates to the hospitality industry	**BT 1**

CO 2	**Understand** of work areas such as Receiving, storing, food preparation, and serving	**BT 2**
CO 3	**Apply** the basic knowledge about menu planning	**BT 3**
CO 4	**Analyse** the standard of recipes and standard portion sizes	**BT 4**
CO 5	**Evaluate** the personnel management and financial management**.**	**BT 5**

Detailed syllabus:

Modules	Topics / Course content	Periods
I	**Food service management-** Principles and functions **Food service organisation-** Development of food service institution, objectives and classification. **Classification of food service institutions according to** a. Function: Profit oriented service. oriented and public health facility oriented b. Processing method: Conventional system, commissary system and fast. food service systems. c. Service of food: Self service, tray service and waiter-waitress service.	**09**
II	**Floor planning and layout-** Characteristics of typical food service facilities. Plan of work areas Receiving, storing, food preparation, cooking, serving, dining, dishwashing, pot and pan washing and garbage disposal: flow space relationship. Working heights and dimensions of work centers. **Equipment-** Catering equipment, selection equipment, equipment design, purchasing equipment and care and maintenance of equipment.	**09**
III	**Quantity food preparation-** Selection, purchasing methods and storage of foods. **Menu planning -** Definition, principles involved in planning and types of menus. **Standardization of recipe-**Definition, standard recipe format and uses. Standard portion sizes Definition, portioning equipments and portion control.	**09**
IV	**Financial management -** Costing and budgeting, pricing and accounting. **Personnel management-** Concepts, staff employment and employment benefits **Hospital food service -** Objectives and classification. **Industrial food service-** Objectives and classification.	**09**
Total		**36**

Textbooks:

Sethi M., Catering Management, Institutional Food Management: An Integrated Approach, New Age International Ltd. Publishers, Third Edition, 2015.

Reference book:

Sethi M and Mahan 8 (Revised 2nd edition, 2007). Catering Management, An Integrated Approach. New Age Inderenational (P) Ltd.

Subject Name: Innovation in Food Product Development	Scheme of Evaluation: (T/P)
Subject Code: NDC154C305/NDC154C315	Credit Units: 2-0-4-4

Course Objective:

The course is designed to appraise the students to know about the concept of product development and to study about steps involved in development of new products and quality control of the products.

Course Outcomes:

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Remember** the important aspects for developing a new food product.	**BT 1**
CO 2	**Understand** the importance of quality control and food safety.	**BT 2**
CO 3	**Apply** knowledge in the development of novel nutrient dense food products	**BT 3**
CO 4	**Analyse** on the processing methods and packaging materials for food products.	**BT 4**
CO 5	**Evaluate** the techniques of food product development considering the quality and safety of the product.	**BT 5**

Detailed syllabus:

Modules	Topics / Course content	Periods
I	**Product development:** concept, introduction, need and market survey **New food product-** Definition, classification, factors shaping new product development: social concern, health concern, impact of market place influence and technology.	**10**
II	**Product development-** Steps, standardization methods, portion size and portion control, shelf life and storage.	**12**
III	**Product evaluation-** Development of score card and analysis of data. Selection and training of judges. **Packaging-** Types, development of packages and Labeling.	**12**
IV	**Quality control-** Objectives, importance, functions of quality control, stages of quality control in food industry. **Government regulations in quality control:**FAO/WHO codex Alimentarius commission, PFA, AGMARK, BIS, FPO, fair average quality (FAQ) specification for food grains, ISO 9000 series. HACCP-Background, principles, benefits and limitation. **Consumer Protection Act (CPA)** **Food adulteration-**Common adulterants and tests to detect common adulterants.	**14**
Total		**48**

Text books:

Avantina Sharma, Textbook of Food Product Development, CBS Publisher and Distributors Pvt. Ltd.

Reference book:

Fuller, G.W. New food product development. Taylor and Francis, CRC Press, 2004

Subject Name: Menu planning & Diet Counseling	**Scheme of Evaluation: (P)**
Subject Code: NDC154C316	**Credit Units: 0-0-6-3**

Course Objective:

Understand the concept of providing nutrition counseling and education to individuals

Course Outcome:

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Remember** the principles and process of Menu planning & counselling	**BT 1**
CO 2	**Understand** the counselling skills for dieticians	**BT 2**
CO 3	**Apply** the basic Principle of menu planning for effective outcome	**BT 3**
CO 4	**Analyse** the role of menu planning & counselling in hospital, community, health camps	**BT 4**
CO 5	**Evaluate** the different approaches to menu planning & Diet counselling	**BT 5**

Detailed syllabus:

Modules	**Topics / Course content**	**Periods**
I	**Diet Counseling and Menu planning:** Introduction, definition and Importance. Types of counseling, advantage and disadvantage. Principle of diet counselingand menu planning, the process of counseling, qualities of an effective counseling.	**08**
II	**Counseling skills for dietician:** Introduction, dietician using counseling skills, qualities of a dietician, developing a counseling approach, different approaches to counseling. **Diet counseling steps:** Assessment components, planning components, Implementation components and evaluation components.	**12**
III	**Role of counseling in hospital, role of counseling in community, organizing health camps** -hospital level and community level, Diet counseling for pregnancy, lactation and child care, Patient follow up/home visits. **Menu planning for specific conditions:** Obesity and weight management,	**12**

	Diabetes, Cardiovascular disease, Eating disorders, Gastrointestinal conditions, Pediatric and geriatric nutrition	
IV	Diet counseling for adolescent, adults and old age. Diet counseling for obese people, Infectious diseases, and AIDS Diet counseling for Diabetes, CVD, Gastrointestinal diseases, liver diseases and cancer.	**16**
Total		**48**

Textbooks:

1. Gibson, R.L., Mitchell, M.H.(2005). Introduction to counselling and guidance (6th Ed).
2. Judey gable, (2005). Counselling skills for dietitians, 2nd edition, black publishing.

Reference books:

1. WHO (2014), NACS, A programme guide.
2. WHO (2018). NACS, module 3 counselling guide.

SYLLABUS (4thSEMESTER)

Subject Name: Research Projects	**Scheme of Evaluation: (P)**
Subject Code: NDC154C401	**Credit Units: 0-0-40-20**