



**ROYAL SCHOOL OF MEDICAL AND  
ALLIED SCIENCES  
(RSMAS)**

**DEPARTMENT OF NUTRITION AND  
DIETETICS**

**COURSE STRUCTURE & SYLLABUS  
(BASED ON NATIONAL EDUCATION POLICY 2020)**

**FOR**

**B.Sc. IN NUTRITION AND DIETETICS  
(4 YEARS SINGLE MAJOR)**

**W.E.F**

**AY - 2024 – 28**

## Course Structure

### B.Sc. in Nutrition & Dietetics

<b>1<sup>st</sup> SEMESTER</b>					
<b>COMPONENT</b>	<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>LEVEL</b>	<b>CREDIT</b>	<b>L-T-P</b>
Major (Core)	NDC152M101	Nutritional Biochemistry	100	3	3-0-0
Major (Core)	NDC152M111	Practical on Nutritional Biochemistry	100	3	0-0-6
Minor	NDC152N101	Fundamentals of Food Science	100	3	3-0-0
Interdisciplinary (IDC)	IKS992K101	IKS I(Introduction to Indian Knowledge System-I)	100	3	3-0-0
Ability Enhancement course (AEC)	CEN982A101	Communicative English- I	100	1	1-0-0
	BHS982A102	Behavioural Science-I	100	1	1-0-0
Skill Enhancement Course (SEC)	NDC152S111	Fruits and Vegetables Processing	100	3	0-0-6
Value Added Course (VAC)		VAC-1 Select one course from a basket of course	100	3	3-0-0
<b>TOTAL CREDIT FOR 1<sup>st</sup> SEMESTER</b>				<b>20</b>	
<b>2<sup>nd</sup> SEMESTER</b>					
<b>COMPONENT</b>	<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>LEVEL</b>	<b>CREDIT</b>	<b>L-T-P</b>
Major (Core)	NDC152M201	Elementary Human Physiology	100	3	3-0-3
Major (Core)	NDC152M211	Practical on Elementary Human Physiology	100	3	0-0-6
Minor	NDC152N201	Basic Microbiology	100	3	3-0-0
IDC	IKS992K201	IKS-II	100	3	3-0-0
AEC	CEN982A201	Communicative English II	100	1	1-0-0
AEC	BHS982A202	Behavioural Science-II	100	1	1-0-0

SEC	NDC152S211	Methods of cookery	100	3	0-0-6
VAC		VAC-2 Select one course from a basket of course	100	3	3-0-0
<b>TOTAL CREDIT FOR 2<sup>nd</sup> SEMESTER</b>				<b>20</b>	

**3<sup>rd</sup> SEMESTER**

COMPONENT	COURSE CODE	COURSE TITLE	LEVEL	CREDIT	L-T-P
Major (Core)	NDC152M301	Principles of Human Nutrition	200	4	4-0-0
Major (Core)	NDC152M302/ NDC152M311	Principles of Menu Planning	200	5	3-0-4
Major (Core)	NDC152M312	Practical on Human Nutrition	200	4	0-0-8
Minor	NDC152N301	Menu Planning	200	4	4-0-0
IDC	NDC242I301	Traditional foods for health and well-being	200	3	0-0-3
AEC	CEN982A301	Communicative English III	100	1	1-0-0
AEC	BHS982A302	Behavioural Science-III	100	1	1-0-0
SEC	NDC152S311	Food Quality Evaluation	200	3	0-0-6
<b>TOTAL CREDIT FOR 3<sup>rd</sup> SEMESTER</b>				<b>20</b>	

**4<sup>th</sup> SEMESTER**

COMPONENT	COURSE CODE	COURSE TITLE	LEVEL	CREDIT	L-T-P
Major (Core)	NDC152M401	Principles of Food Processing	200	4	4-0-0
Major (Core)	NDC152M402	Therapeutic Nutrition I	200	5	4-1-0
Major (Core)	NDC152M403/ NDC152M411	Innovative Product Development	200	5	3-0-4
Major (Core)	NDC152M412	Practical on Food Processing and Therapeutic Nutrition	200	4	0-0-8

Minor	NDC152N401	Food Product Development	200	3	NDC152N401
Minor	NDC152N402	Sensory Evaluation	200	3	NDC152N402
AEC	CEN982A401	Communicative English IV	100	1	1-0-0
	BHS982A402	Behavioural Science-IV	100	1	1-0-0
<b>TOTAL CREDIT FOR 4<sup>th</sup>SEMESTER</b>				<b>20</b>	

**5<sup>th</sup> SEMESTER**

COMPONENT	COURSE CODE	COURSE TITLE	LEVEL	CREDIT	L-T-P
Major (Core)	NDC152M501	Therapeutic Nutrition II	300	4	4-0-0
Major (Core)	NDC152M502	Food Standard and Quality Control	300	4	4-0-0
Major (Core)	NDC152M503	Food Hygiene and Sanitation	300	4	4-0-0
Major (Core)	NDC152M504	Research Methodology	400	4	4-0-0
Major (Core)	NDC152M511	Practical on Therapeutic & Clinical Nutrition	300	4	0-0-8
Minor	NDC152N501	Basics of Food Toxicology	300	4	4-0-0
<b>TOTAL CREDIT FOR 5<sup>th</sup>SEMESTER</b>				<b>20</b>	

**6<sup>th</sup> SEMESTER**

COMPONENT	COURSE CODE	COURSE TITLE	LEVEL	CREDIT	L-T-P
Major (Core)	NDC152M601	Nutrition Through life Cycle	300	4	4-0-0
Major (Core)	NDC152M602	Community Nutrition	300	4	4-0-0
Major (Core)	NDC152M603	Food Service Management	300	4	4-0-0
Major (Core)	NDC152M604	Nutraceuticals and	400	4	4-0-0

		Functional Foods			
Major (Core)	NDC152M611	Practical on Lifecycle Nutrition and Community Nutrition	300	4	0-0-8
Minor	NDC152N601	Animal Products Processing & Utilization	300	4	4-0-0
<b>TOTAL CREDIT FOR 6<sup>th</sup>SEMESTER</b>				<b>20</b>	
<b>7<sup>th</sup> SEMESTER</b>					
<b>COMPONENT</b>	<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>LEVEL</b>	<b>CREDIT</b>	<b>L-T-P</b>
Major (Core)	NDC152M701	Public Health Nutrition	400	4	4-0-0
Major (Core)	NDC152M711	Practical on Public Health Nutrition	400	4	0-0-8
Minor	NDC152N701	Food Business Management	400	4	4-0-0
Research Project	NDC152M721	Research Project	400	12	
<b>TOTAL CREDIT FOR 7<sup>th</sup>SEMESTER</b>				<b>20</b>	
<b>8<sup>th</sup> Semester (Apprenticeship/Internship)</b>					
<b>8<sup>th</sup> SEMESTER</b>					
<b>COMPONENT</b>	<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>LEVEL</b>	<b>CREDIT</b>	<b>L-T-P</b>
Major (Core)	NDC152M811	Internship	400	20	
<b>TOTAL CREDIT FOR 8<sup>th</sup>SEMESTER</b>				<b>20</b>	

## Detailed Syllabus

### Semester I

<b>Course: Major</b>	<b>Course Level-100</b>	<b>Scheme Evaluation: (T)</b>
<b>Title of Paper: Nutritional Biochemistry</b>	<b>Subject Code: NDC152M101</b>	
<b>L-T-P-C: 3-0-0-3</b>	<b>Total credits: 3</b>	

#### Course Objectives

To train the students with basic knowledge of biochemistry of different major nutrients– carbohydrates, lipids, proteins and related aspects.

#### Course Outcomes

On successful completion of the course the students will be able to:		
CO	Course Outcome	Blooms Taxonomy Level
CO 1	<b>Relate</b> the classifications and functions of major macro nutrients	<b>BT 1</b>
CO 2	<b>Explain</b> different metabolic pathways	<b>BT 2</b>
CO 3	<b>Develop</b> different concept of food functions	<b>BT 3</b>
CO 4	<b>Analyse</b> the significance of the nutrients and health	<b>BT 4</b>

#### Course Outline

Modules	Topics (if applicable) & Course Contents	Periods
<b>I.</b>	Introduction to biochemistry - Definition, objectives, scope and inter relationship between biochemistry and other biological science	<b>15</b>
<b>II.</b>	Definition, types and classification of enzymes, definition and types of coenzymes, specificity of enzymes, isozymes, enzyme, kinetics including factors affecting enzyme action, velocity of enzyme catalyzed reactions, enzyme inhibitions	<b>15</b>
<b>III.</b>	Intermediary metabolism - Carbohydrate metabolism, glycolysis, TCA cycle and energy generation, gluconeogenesis, glycogenesis, glycogenolysis, blood sugar regulation, Lipids - Oxidation and biosynthesis of fatty acids (saturated and mono-unsaturated) - Synthesis and utilization of ketone bodies, ketosis, fatty livers,	<b>15</b>
<b>IV.</b>	Proteins - General reaction of amino acid metabolism, urea cycle, lipoproteins - Types, composition, role and significance in disease.	<b>15</b>
	<b>TOTAL</b>	<b>60</b>
	<b>Pedagogy: Lectures, Assignments, Seminars</b>	

**Texts:**

1. West, E. S., Todd, W. R.; Mason. H.S. and Van Bruggen J.T.: 4th Ed. Text book of Biochemistry. Amerind Publishing Co. Pvt. Ltd.
2. Murray, R. K. Grannen, D. K.; Mayes, P. A. and Rodwell. V. W.: Harper's biochemistry. Lange Medical Book.

**References:**

1. Handler, P.; Smith E.I.; Stelten, D. W. : Principles of biochemistry, Me. Grew Hill Book Co.
2. Lehninger, A.L.; Nelson, D. L. and Cox, M. M. Principles of biochemistry. CBS Publishers and Distributors.
3. Devlin, T. M. : Text Book of biochemistry with clinical corelations. John Wiley and Sons.

<b>Credit Distribution</b>		
<b>Theory</b>	<b>Practical</b>	<b>Experiential Learning</b>
<b>60</b>	<b>-</b>	<b>30</b>
		<b>Handling &amp; conducting estimation of human fluids for biochemical parameters</b>

<b>Course: Major</b>	<b>Level of Course: 100</b>	<b>Scheme of Evaluation: (P)</b>
<b>Title of Paper: Practical on Nutritional Biochemistry</b>	<b>Subject Code: NDC152M111</b>	
<b>L-T-P-C: 0-0-6-3</b>	<b>Total credits: 3</b>	

**Course Objectives**

Understanding the techniques, handling equipments/apparatus and carry out the experiments

**Course Outcomes**

<b>On successful completion of the course the students will be able to:</b>		
<b>CO</b>	<b>Course Outcome</b>	<b>Blooms Taxonomy Level</b>
<b>CO 1</b>	<b>define</b> basic sample and solution preparations	<b>BT 1</b>
<b>CO 2</b>	<b>classify</b> the different categories of techniques	<b>BT 2</b>
<b>CO 3</b>	<b>construct</b> the procedures of biochemical analysis	<b>BT 3</b>
<b>CO 4</b>	<b>analyse</b> the process of concentration in biological fluids/samples	<b>BT 4</b>

## Course Outline

Modules	Topics (if applicable) & Course Contents	Periods
I.	Introduction to handling of equipment and instruments, preparation of samples, solutions and buffers	24
II	Blood constituents: Estimation of haemoglobin, blood glucose	22
III	Estimation of reducing and non-reducing sugars	22
IV	Urine constituents: Estimation of protein levels, glucose levels in urine, ketone bodies in urine, urine constituents	22
	<b>Total</b>	<b>90</b>
	<b>Pedagogy: Lectures, Experiments, Laboratory sessions</b>	

**Recommended Texts:** As suggested under the theory papers

<b>Course: SEC 1</b>	<b>Level of Course: 100</b>	<b>Scheme of Evaluation: (P)</b>
<b>Title of Paper: Fruits and Vegetables Processing</b>	<b>Subject Code: NDC152S111</b>	
<b>L-T-P-C: 0-0-6-3</b>	<b>Total credits: 3</b>	

## Course Outcomes

On successful completion of the course the students will be able to:		
CO	Course Outcome	Blooms Taxonomy Level
CO 1	<b>define</b> basic fruits and vegetable varieties and identify their maturity indices	<b>BT 1</b>
CO 2	<b>classify</b> the TSS, acidity, firmness of different fruits and vegetables	<b>BT 2</b>
CO 3	<b>construct</b> the process for identification of spices and additives in different fruits and vegetables	<b>BT 3</b>
CO 4	<b>analyse</b> the procedures for equipment maintenance in a controlled atmospheric unit	<b>BT 4</b>

## Course Outline

Modules	Topics (if applicable) & Course Contents	Periods
I.	1. Identification of different food groups (cereals, pulses, fruits and vegetables) 2. Moisture estimation of samples from different food groups (cereals, pulses, fruits and vegetables) as an understanding of perishable, semi-perishable and non-perishable foods.	24

<b>II</b>	1. Learning pre-processing operations- sorting, grading, washing, cleaning, peeling, cutting. 2. Learning processing operations- blanching, pasteurization, drying, dehydration, freezing, fermentation.	<b>22</b>
<b>III</b>	1. Preparation of jam, jellies and marmalade. 2. Preparation of pickles	<b>22</b>
<b>IV</b>	1. Cleaning and maintenance of equipment 2. Project planning on food processing unit.	<b>22</b>
<b>Total</b>		<b>90</b>
<b>Pedagogy: Lectures, Experiments, Laboratory sessions</b>		

**Recommended Texts:** As suggested under the theory papers

<b>Course: Minor</b>	<b>Level of Course: 100</b>	<b>Scheme of Evaluation: (T)</b>
<b>Title of Paper: Fundamentals of Food Science</b>	<b>Subject Code: NDC152N101</b>	
<b>L-T-P-C: 3-0-0-3</b>	<b>Total credits: 3</b>	

### Course Outcomes

<b>On successful completion of the course the students will be able to:</b>		
<b>CO</b>	<b>Course Outcome</b>	<b>Blooms Taxonomy Level</b>
<b>CO 1</b>	<b>Relate</b> the principle of food science, and food constituents- its properties and functions	<b>BT 1</b>
<b>CO 2</b>	<b>Explain</b> the basic preservation techniques used in food science	<b>BT 2</b>
<b>CO 3</b>	<b>Develop</b> different types of non thermal processing techniques used in food Industry	<b>BT 3</b>
<b>CO 4</b>	<b>Analyse</b> the different advantages and disadvantages of different preservation techniques in terms of increasing shelf life	<b>BT 4</b>

### Course Outline

<b>Modules</b>	<b>Topics (if applicable) &amp; Course Contents</b>	<b>Periods</b>
<b>I.</b>	<b>Introduction to Food Science-</b> Basic terms like food, nutrients, nutrition, diseases and disorders, etc. <b>Food constituents and their functions:</b> Carbohydrates and proteins, food sources, effects of deficiency and excess in body	<b>15</b>
<b>II.</b>	<b>Food constituents and their functions:</b> Lipids, vitamins and minerals, food sources, effects of deficiency and excess in body	<b>15</b>
<b>III.</b>	<b>Food preservation techniques:</b> Pasteurization, Sterilization, Ultra High temperature, Blanching, etc. Low temperature preservation techniques: Cooling, Evaporation, refrigeration and freezing, Drying	<b>15</b>

<b>IV.</b>	<b>Unit operations in Food Processing:</b> Cleaning, dry cleaning methods, wet cleaning methods, peeling, grading, sorting.	<b>15</b>
	<b>TOTAL</b>	<b>60</b>
	<b>Pedagogy: Lectures, Assignments, Seminars</b>	

**Texts:**

1. Food Science by Norman N Potter and Joseph H. Hotchkiss, CBS Publishers and Distributors.
2. Advanced Textbook on Food and Nutrition by Dr. M. Swaminathan Vol: I & II, The Bangalore Printing and Publishing Co. Ltd.

**References:**

1. Fellows PJ, 2016. Food Processing Technology, Principles and Practice. Fourth Edition. Woodhead Publishing
2. Sivasankar B. Latest edition. *Food Processing and Preservation*. First Edition. PHI Learning

<b>Credit Distribution</b>		
<b>Theory</b>	<b>Practical</b>	<b>Experiential Learning</b>
<b>60</b>	-	<b>30</b>
		<b>Food processing techniques of different foods</b>

## Semester II

<b>Course: Major</b>	<b>Level of Course: 100</b>	<b>Scheme of Evaluation: (T)</b>
<b>Title of Paper: Elementary Human Physiology</b>	<b>Subject Code: NDC152M201</b>	
<b>L-T-P-C: 3-0-0-3</b>	<b>Total credits: 3</b>	

### Course Objectives

To understand the human anatomy and physiology with different systems of the body

### Course Outcomes

<b>On successful completion of the course the students will be able to:</b>		
<b>CO</b>	<b>Course Outcome</b>	<b>Blooms Taxonomy Level</b>
<b>CO 1</b>	<b>Explain</b> the human anatomy and physiology	<b>BT 1</b>
<b>CO 2</b>	<b>Identify</b> different body systems.	<b>BT 2</b>
<b>CO 3</b>	<b>Apply</b> knowledge in understanding how the systems works	<b>BT 3</b>
<b>CO 4</b>	<b>Analyse</b> the conditions which may occur due to abnormal functioning of the systems	<b>BT 4</b>

### Course Outline

<b>Modules</b>	<b>Topics (if applicable) &amp; Course Contents</b>	<b>Periods</b>
<b>I.</b>	Introduction to anatomy and physiology and structural organization of body. The cell – Structure, its organelles, functions and multiplications, different types of cells and their functions, movement of particles across cell membrane - Active transport and passive transport ,Body fluids and its compartments and functions	<b>15</b>
<b>II.</b>	Water output and input into the body and maintenance of water balance in human body , the tissues – Types, structure and their functions, the skeletal system - Anatomy and functions, structure, formation and development of bones, different types of bones and types of joints and their movements.	<b>15</b>
<b>III.</b>	Circulatory system - The blood - Composition and function, blood clotting and blood grouping, Heart – Structure, functions, types of circulatory systems, blood pressure and heart rate and factors affecting it, electrocardiogram, the respiratory system - anatomy, functions, mechanism of breathing and respiratory volumes, gas transport and respiratory adaptation, the digestive system - anatomy and functions of alimentary tract and accessory organs, process of digestion of food, absorption and assimilation of digested food, enzymes involved in digestion of food, liver - Structure and functions,	<b>15</b>

<b>IV</b>	Pancreas – Structure and functions, the urinary system - Anatomy and functions, formation and composition of urine, the endocrine system - important ductless glands of the body and their functions, the reproductive system - Male reproductive system – Anatomy and functions, female reproductive system – Anatomy and functions, menstrual cycle, the nervous system - elementary study of (anatomy and functions), sensory organs – (anatomy and functions). Glossary of terms used in physiology	<b>15</b>
<b>TOTAL</b>		<b>60</b>
<b>Pedagogy: Lectures, Assignments, Seminars</b>		

**Texts:**

1. Arthur J. V. Human physiology- The mechanisms of body function, Tata McGraw Hill Publishing Company, New Delhi.
2. Samson, Applied physiology 10<sup>th</sup> edn. Revised by Keele, C.A. and Neil, B. Oxford University Press, New York.
3. Guyton C. Text Book of medical physiology 5<sup>th</sup> edn. W.B. Saunders Company- Philadelphia, London.

**References:**

1. Text book of Human Physiology by P. Sathya, Viji Devanand, V M Ahuja, CBS Publishers & Distributors, 2018.

<b>Credit Distribution</b>		
<b>Theory</b>	<b>Practical</b>	<b>Experiential Learning</b>
<b>60</b>	-	<b>30</b>
		<b>Laboratory experience of conducting assessment on human physiology</b>

<b>Course: Major</b>	<b>Level of Course: 100</b>	<b>Scheme of Evaluation: (P)</b>
<b>Title of Paper: Practical on Human Physiology</b>		<b>Subject Code: NDC152M211</b>
<b>L-T-P-C: 0-0-6-3</b>		<b>Total credits: 3</b>

**Course Objectives**

Understanding the human anatomy and physiology and their relation with diseases and nutrients.

## Course Outcomes

On successful completion of the course the students will be able to:		
CO	Course Outcome	Blooms Taxonomy Level
CO 1	Define the human physiological system practically using models	BT 1
CO 2	Classify the systems of the human body and their functions	BT 2
CO 3	Construct the slides, solutions and other preparations required for estimations	BT 3
CO 4	Analyse different constituents in fluids	BT 4

## Course Outline

Modules	Topics (if applicable) & Course Contents	Periods
I.	Demonstration of animal viscera, identification of systems and organs, identification of cells – epithelial, muscle, nerve etc	24
II	Transverse section of stomach, intestine – small and large demonstration of specimens of spleen, kidney and brain models of excretory and reproductive organs and their histology	22
III	Colorimetric estimation of RBC count by haemocytometer, estimation of WBC count by haemocytometer, differential counting of WBC using peripheral smear	22
IV	Estimation of PCV, ESR, micro and macro haematocrit, estimation of bleeding and clotting time and blood groups, measurement of pulse rate and blood pressure, its variation with exercise, testing for sensation, special sensors, measurement of body temperature, diurnal variations.	22
	<b>Total</b>	<b>90</b>
	<b>Pedagogy: Lectures, Experiments, Laboratory sessions</b>	

**Recommended Texts:** As suggested under the theory papers

<b>Course: SEC 2</b>	<b>Level of Course: 100</b>	<b>Scheme of Evaluation: (P)</b>
<b>Title of Paper: Methods of cookery</b>		<b>Subject Code: NDC152S211</b>
<b>L-T-P-C: 0-0-6-3</b>		<b>Total credits: 3</b>

## Course Objectives

Understanding the various methods of cookery and resultant products.

## Course Outcomes

On successful completion of the course the students will be able to:		
CO	Course Outcome	Blooms Taxonomy Level
CO 1	Define the different methods of cookery	BT 1
CO 2	Classify the cookery methods and procedural details	BT 2
CO 3	Construct the products out of different cooking methods	BT 3
CO 4	Analyse the changes and quality of the output with different methods	BT 4

## Course Outline

Modules	Topics (if applicable) & Course Contents	Periods
I.	Introduction to kitchen equipment and apparatus Handling and care of the equipment and apparatus Sanitization of the equipment and apparatus	24
II	Demonstration on basic cooking methods using different categories of foods- cereals, pulses, fruits, vegetables, animal foods	22
III	Conduction of different practical using the different methods of cookery and different foods	22
IV	Quantity production using different methods and foods	22
	<b>Total</b>	<b>90</b>
	<b>Pedagogy: Lectures, Experiments, Laboratory sessions</b>	

**Recommended Texts:** As suggested under the theory papers

<b>Course: Minor</b>	<b>Level of Course: 100</b>	<b>Scheme of Evaluation: (T)</b>
<b>Title of Paper: Basic Microbiology</b>		<b>Subject Code: NDC152N201</b>
<b>L-T-P-C: 3-0-0-3</b>		<b>Total credits: 3</b>

## Course Objectives

To train the students with various microbial growth control techniques in food preparation.

## Course Outcomes

On successful completion of the course the students will be able to:		
CO	Course Outcome	Blooms Taxonomy Level
CO 1	Relate the scope, importance, basic techniques of microbiology	BT 1
CO 2	Explain the various sterilization- both physical and chemical methods	BT 2
CO 3	Develop the different methods for isolation and preservation of	BT 3

	food microbes	
<b>CO 4</b>	<b>Analyse</b> the application of food microbiology and its comparison to other fields of microbiology	<b>BT 4</b>

### Course Outline

Modules	Topics (if applicable) & Course Contents	Periods
<b>I.</b>	History and scope of Microbiology, discovery, importance and relevance of microorganisms. Microscopy: basic techniques of Microscopy optical and electron techniques of microscopy staining and its types.	<b>15</b>
<b>II.</b>	<b>Microbial Control:</b> sterilization and disinfection techniques. Physical and chemical methods of sterilization. <b>Important cultural characteristics</b> of Bacteria, Virus, Fungus and algae. Culture of micro-organisms culture media natural complex, semi defined, synthetic media, minimal media. General and selective media, Anaerobic cultures.	<b>15</b>
<b>III.</b>	<b>Isolation and preservation</b> of pure cultures. Pour plate method, streak plate spread plate and single cell isolation, micromanipulator and capillary pipette method.	<b>15</b>
<b>IV.</b>	<b>Applications</b> – Food microbiology, Agriculture microbiology, Medical microbiology, Industrial microbiology Environmental and Biotechnology microbiology.	<b>15</b>
	<b>TOTAL</b>	<b>60</b>
	<b>Pedagogy: Lectures, Assignments, Seminars</b>	

### Texts:

1. Microbiology (5th Ed) by M. J. Pelczar, E. C. S. Chan and Noel R. Krieg. Tata McGrawHill.
2. Microbiology by R. P. Singh Kalyani Publishers.

### References:

1. Fellows PJ, 2016. Food Processing Technology, Principles and Practice. Fourth Edition. Woodhead Publishing
2. Sivasankar B. Latest edition. *Food Processing and Preservation*. First Edition. PHI Learning

Credit Distribution		
Theory	Practical	Experiential Learning
<b>60</b>	-	<b>30</b>
		<b>Laboratory experience on microbial techniques</b>

### Semester III

<b>Course: Major</b>	<b>Level of Course: 200</b>	<b>Scheme of Evaluation: (T)</b>
<b>Title of Paper: Principles of Human Nutrition</b>	<b>Subject Code: NDC152M301</b>	
<b>L-T-P-C: 4-0-0-4</b>	<b>Total credits: 4</b>	

#### Course Objectives

Understanding how the body processes food for growth, metabolism, and repair.

#### Course Outcomes

On successful completion of the course the students will be able to:		
CO	Course Outcome	Blooms Taxonomy Level
CO 1	Relate the functions of nutrients in terms of disease condition	BT 1
CO 2	Explain the functioning of nutrients in details	BT 2
CO 3	Develop understanding related to function of digestion, absorption and the sources of nutrients	BT 3
CO 4	Analyse the symptoms of the deficiency disease	BT 4

#### Course Outline

Modules	Topics (if applicable) & Course Contents	Periods
I.	<b>Science of Nutrition</b> , Concept of Nutrition Definition of nutrition, health, nutritional status and malnutrition. <b>RDA</b> - Definition, factors affecting RDA and methods used for deriving RDA. <b>Carbohydrates</b> - Definition composition, functions, maintenance of blood sugar levels, requirement, sources, digestion and absorption; Dietary fiber- Definition, classification, physiological effects and sources.	15
II.	<b>Proteins</b> - Definition, composition, nutritional classification of proteins and amino acids, functions, sources, requirements, digestion and absorption. Evaluation of protein quality: PER, BV, NPU and Chemical score. <b>Lipids</b> -Definition, composition, functions, sources, requirements, digestion and absorption. Essential fatty acids. Definition, functions, sources and effects of deficiency.	15
III.	<b>Energy</b> - Definition, units of measurement, direct and indirect calorimetry; Determination of energy value of food, Total Energy requirement, Factors affecting physical activity, Factors affecting Basal Metabolic Rate, factors affecting Thermic effect of food, Recommended Dietary Allowances and Sources	15
IV.	<b>Fat soluble Vitamins Vitamin A, D, E and K:</b> Functions, requirements, sources and effects of deficiency. <b>Water Soluble Vitamins</b> Thiamine, riboflavin, niacin, ascorbic acid, folic acid, vitamin B6 and vitamin B12: Functions, requirements, sources and effects of deficiency. <b>Macro Minerals</b> - Calcium and Phosphorous: Functions, requirements, sources and effects of deficiency. <b>Micro minerals</b> - Iron, Iodine, Copper, Fluorine and Zinc:	15

	Functions, sources, requirements and effects of deficiency. Sodium and Potassium: Functions, sources, requirements and effects of imbalances.	
	<b>TOTAL</b>	<b>60</b>
	<b>Pedagogy: Lectures, Assignments, Seminars</b>	

**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. Mahtab S. 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.

<b>Credit Distribution</b>		
<b>Theory</b>	<b>Practical</b>	<b>Experiential Learning</b>
<b>88</b>	-	<b>32</b>
		<b>Effect of different components of food on human health</b>

<b>Course: Major</b>	<b>Level of Course: 200</b>	<b>Scheme of Evaluation: (T)</b>
<b>Title of Paper: Principles of Menu Planning</b>	<b>Subject Code: NDC152M302/ NDC152M311</b>	
<b>L-T-P-C: 4-0-2-5</b>	<b>Total credits: 5</b>	

**Course Objectives**

This course focuses on the fundamental principles of menu planning, emphasizing nutritional adequacy, food safety, and cost-effectiveness. Students will learn to create balanced menus that cater to various dietary needs and preferences.

**Course Outcomes**

<b>On successful completion of the course the students will be able to:</b>		
<b>CO</b>	<b>Course Outcome</b>	<b>Blooms Taxonomy Level</b>

<b>CO 1</b>	<b>Relate</b> the principle of menu planning and its role in daily life	<b>BT 1</b>
<b>CO 2</b>	<b>Apply</b> food safety and sanitation practices in menu planning	<b>BT 2</b>
<b>CO 3</b>	<b>Develop</b> nutritionally balanced menus for diverse populations with specific dietary needs	<b>BT 3</b>
<b>CO 4</b>	<b>Analyse</b> food costs and design appealing, cost-effective menus for various food service settings	<b>BT 4</b>

## Course Outline

<b>Modules</b>	<b>Topics (if applicable) &amp; Course Contents</b>	<b>Periods</b>
<b>I.</b>	<b>Introduction to Menu Planning</b> Understanding Menu Planning- Definition and importance of menu planning, Types of menus (static, cycle, à la carte, etc.) Nutritional Guidelines- Dietary guidelines and recommendations, Understanding macronutrients and micronutrients Factors Influencing Menu Planning- Cultural, seasonal, and economic factors, Client preferences and dietary restrictions	<b>15</b>
<b>II.</b>	<b>Nutritional Considerations in Menu Planning</b> Balanced Diet Principle- Components of a balanced diet, Meal planning for different age groups and health conditions Special Diets- Planning menus for special dietary needs (e.g., vegetarian, gluten-free, diabetic), Understanding food allergies and intolerances Food Safety and Sanitation- Importance of food safety in menu planning, Safe food handling practices and storage	<b>15</b>
<b>III.</b>	<b>Costing and Evaluation of Menus</b> Costing of Menu Items- Understanding food cost calculations, Pricing strategies for menu items Menu Evaluation Techniques- Methods for evaluating menu effectiveness, Customer feedback and satisfaction surveys Menu Design and Presentation- Principles of menu design (layout, language, and aesthetics), Importance of visual appeal in menu planning	<b>15</b>
<b>IV.</b>	<b>Practical Applications in Menu Planning</b> Practical Menu Planning- Hands-on experience in creating menus for various settings (cafeterias, restaurants, etc.), Incorporating nutritional guidelines into practical menus Menu Implementation- Strategies for implementing and managing menus in food service operations, Role-playing scenarios for menu presentation and customer interaction Review and Feedback- Presenting practical menus to peers for critique Incorporating feedback into menu revisions	<b>15</b>
	<b>TOTAL</b>	<b>60</b>
	<b>Pedagogy: Lectures, Assignments, Seminars</b>	

## Text Books:

1. Paul J. *et al*; Fundamentals of Menu Planning, 3<sup>rd</sup> edition, Wiley; 3rd edition (28 March 2008).
2. Sethi M. *et al*; Entrepreneurship and Food Service Management, IGNOU, 2022.

### Reference Books:

1. Mohini Seth; Institutional Food Management, 2nd edition, New Age International Publishers, 2016

<b>Course: Major</b>	<b>Level of Course: 200</b>	<b>Scheme of Evaluation: (P)</b>
<b>Title of Paper: Practical on Human Nutrition</b>	<b>Subject Code: NDC152M312</b>	
<b>L-T-P-C: 0-0-8-4</b>	<b>Total credits: 4</b>	

### Course Objectives

To develop knowledge and apply skill of the students in formulation of healthy diet plans.

### Course Outcomes

On successful completion of the course the students will be able to:		
CO	Course Outcome	Blooms Taxonomy Level
CO 1	Define the basic terms related to human nutrition	BT 1
CO 2	Classify the different nutrients based on their function	BT 2
CO 3	Construct the diet plans related to different condition/requirement	BT 3
CO 4	Analyse the role of different food constituents in protecting human health	BT 4

### Course Outline

Modules	Topics (if applicable) & Course Contents	Periods
I.	Introduction to food groups, nutritive value and their role in planning diets, concept of "My Plate".	22
II.	RDA Table, Menu Planning Planning and calculation one day menu for different age and sex groups mentioning the portion size and nutritive value of each.	24
III.	Planning, preparation and calculation of nutritive values of low cost complementary foods.	22
IV.	Planning, preparation and calculation of low cost nutritious recipes.	22
	<b>TOTAL</b>	<b>90</b>
	<b>Pedagogy: Lectures, Assignments, Seminars</b>	

### 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.

<b>Course: Minor</b>	<b>Level of Course: 200</b>	<b>Scheme of Evaluation: (T)</b>
<b>Title of Paper: Menu Planning</b>	<b>Subject Code: NDC152N301</b>	
<b>L-T-P-C: 4-0-0-4</b>	<b>Total credits: 4</b>	

### Course Objectives

To introduce the students with basics of menu planning based on the required condition.

### Course Outcomes

On successful completion of the course the students will be able to:		
CO	Course Outcome	Blooms Taxonomy Level
CO 1	Relate the principle of menu planning and its role in daily life	BT 1
CO 2	Explain the functioning of different types of menus.	BT 2
CO 3	Develop menus for personal and industrial application.	BT 3
CO 4	Analyse the hygiene and sanitation of institutional food service.	BT 4

### Course Outline

Modules	Topics (if applicable) & Course Contents	Periods
I.	<b>Introduction to terms related to menu planning-</b> RDA, nutritive value and its calculation, evolution of the food service industry, food management, factors affecting food choice.	15
II.	<b>Types of menu</b> – a la carte menus, static menus, du jour menus, cycle menus, and fixed menus, function of different menus, food groups, food exchange list, benefits and limitations of exchange list, menuplanning according to income groups.	15
III.	<b>Financial Management</b> – Introduction to financial management, costing and budgeting, pricing, accounting.	15

	<b>Planning menu for different institutions</b> - schools, college canteen, hostel, hotels/restaurants, celebrations/parties.	
<b>IV.</b>	<b>Food hygiene, sanitation and safety:</b> general principle of food hygiene and sanitation, personal hygiene and food handling habits, definition and meaning, deteriorative effects of microorganisms- physical and chemical changes.	<b>15</b>
	<b>TOTAL</b>	<b>60</b>
	<b>Pedagogy: Lectures, Assignments, Seminars</b>	

**Text Books:**

3. Paul J. *et al*; Fundamentals of Menu Planning, 3<sup>rd</sup> edition, Wiley; 3rd edition (28 March 2008).
4. Sethi M. *et al*; Entrepreneurship and Food Service Management, IGNOU, 2022.

**Reference Books:**

2. Mohini Seth; Institutional Food Management, 2nd edition, New Age International Publishers, 2016

<b>Credit Distribution</b>		
<b>Theory</b>	<b>Practical</b>	<b>Experiential Learning</b>
<b>88</b>	-	<b>32</b>
		<b>Steps and procedures for setting a food court in different institutions</b>

<b>Course: IDC</b>	<b>Level of Course: 200</b>	<b>Scheme of Evaluation: (T)</b>
<b>Title of Paper: Traditional foods for health and well-being</b>	<b>Subject Code: NDC242I301</b>	
<b>L-T-P-C: 0-0-3-3</b>	<b>Total credits: 3</b>	

**Course Objectives**

To develop the students with practical skills to identify key nutritional components and health benefits of traditional food preparations.

**Course Outcomes**

<b>On successful completion of the course the students will be able to:</b>		
<b>CO</b>	<b>Course Outcome</b>	<b>Blooms Taxonomy Level</b>
<b>CO 1</b>	<b>Remember</b> the basic terms related to traditional methods of cooking and its impact on nutrition.	<b>BT 1</b>
<b>CO 2</b>	<b>Classify</b> the relationship between traditional dietary patterns and	<b>BT 2</b>

	chronic disease prevention	
<b>CO 3</b>	<b>Develop</b> skills to incorporate traditional food principles into modern meal planning	<b>BT 3</b>
<b>CO 4</b>	<b>Analyse</b> the sustainability aspects of traditional food system.	<b>BT 4</b>

### Course Outline

Modules	Topics (if applicable) & Course Contents	Periods
<b>I.</b>	<b>Introduction to basic terms of nutrition:</b> Food, nutrients, nutrition, health, disease, disorder. <b>Role of nutrition in maintaining health and well-being</b>	<b>22</b>
<b>II.</b>	<b>Traditional methods of cooking in India:</b> moist heat methods, dry heat methods, combination methods. <b>Role of spices and condiments in Indian traditional cooking.</b>	<b>24</b>
<b>III.</b>	<b>Fermentation and traditional food preservation methods:</b> Drying, dehydration, pickling, etc. <b>Medicinal foods and herbs in traditional diets.</b>	<b>22</b>
<b>IV.</b>	<b>Mini project:</b> Collection and preparation of a herbarium consisting of common medicinal herbs found in India.	<b>22</b>
	<b>TOTAL</b>	<b>90</b>
	<b>Pedagogy: Lectures, Assignments, Seminars</b>	

#### Textbook:

1. Subbulakshmi G., and Subhadra M., Nutrition in traditional therapeutic foods, 2020, Daya Publishing House, Volume-2.

#### Reference book:

1. Shanahan C., and Shanahan L., Deep Nutrition- Why your genes need traditional food, 2019, Macmillan US.

<b>Course: SEC</b>	<b>Level of Course: 200</b>	<b>Scheme of Evaluation: (T)</b>
<b>Title of Paper: Food Quality Evaluation</b>		<b>Subject Code: NDC152S311</b>
<b>L-T-P-C: 3-0-0-3</b>		<b>Total credits: 3</b>

### Course Objectives

To develop the students with practical skills required to work in food laboratory and analyse the nutrient aspects of food.

## Course Outcomes

On successful completion of the course the students will be able to:		
CO	Course Outcome	Blooms Taxonomy Level
CO 1	Define the basic terms related to food analysis	BT 1
CO 2	Classify the different methods used for analysis of food sample	BT 2
CO 3	Construct the idea to characterize food products in terms of chemical composition, safety, quality, sensory perception and nutritional value.	BT 3
CO 4	Analyse the nutrient content of the food sample	BT 4

## Course Outline

Modules	Topics (if applicable) & Course Contents	Periods
I.	<b>Nature and concepts of food analysis;</b> Different principles of analytical techniques based on colorimetry, spectrophotometry, atomic absorption of spectrophotometry, flame photometry, separation techniques by chromatography.	22
II.	<b>Chemical analysis lab:</b> need and requirements of a chemical analysis laboratory Proximate analysis of different food groups in terms of moisture, ash, carbohydrate, fibre.	24
III.	<b>Sensory evaluation lab:</b> introduction to sensory lab, need and requirements, Identification and differentiation of colour, flavour, texture, etc., threshold test using different taste samples like sugar, salt, citric acid and monosodium glutamate. <b>Sensory panel:</b> types, criteria for panel selection.	22
IV.	<b>Methods for Sensory Evaluation:</b> Classification of test methods; discrimination tests: paired-comparison, duo-trio and triangle tests; affective tests: qualitative (interview and focus group) and quantitative tests (paired preference and acceptance tests); Two sample test, Ranking test, Two sample difference test, numeric scoring test, hedonic ranking test.	22
	<b>TOTAL</b>	<b>90</b>
	<b>Pedagogy: Lectures, Assignments, Seminars</b>	

### 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

## Semester IV

<b>Course: Major</b>	<b>Level of Course: 200</b>	<b>Scheme of Evaluation: (T)</b>
<b>Title of Paper: Principles of Food Processing</b>	<b>Subject Code: NDC152M401</b>	
<b>L-T-P-C: 4-0-0-4</b>	<b>Total credits: 4</b>	

### Course Objectives

To understand the importance, principles and need of food processing and learn different processing techniques.

### Course Outcomes

On successful completion of the course the students will be able to:		
CO	Course Outcome	Blooms Taxonomy Level
CO 1	Relate the significance of different food processing techniques.	BT 1
CO 2	Explain the various food processing techniques and their impact on nutritional value of food.	BT 2
CO 3	Develop understanding of different preservation techniques and additives used in them.	BT 3
CO 4	Analyse the significance of preservative techniques.	BT 4

### Course Outline

Modules	Topics (if applicable) & Course Contents	Periods
I.	<b>Principles of food processing and preservation-</b> Preservation by low and high temperatures, canning, osmotic pressure, dehydration & drying, irradiation. & use of preservatives, food additives, definition, types, importance and industrial uses of food additives.	15
II.	<b>Methods of processing of cereals, legumes, and oilseeds:</b> Composition and nutritive value, milling, parboiling, gelatinization, dextrinization, rancidity. <b>Methods of processing of fruits and vegetables</b> —different methods of processing of pickles, juice, squash, canned products etc.	15
III.	<b>Methods of processing of milk &amp; milk products</b> — composition, fermentation, different methods of processing of pasteurized milk, ghee, butter, curd, cheese etc.	15
IV.	<b>Methods of processing of animal foods</b> —salting, smoking, curing and fermentation, pickling. <b>Food fortification and enrichment</b> -current trends & applications, fermented food products.	15
	<b>TOTAL</b>	<b>60</b>
	<b>Pedagogy: Lectures, Assignments, Seminars</b>	

**Text Books:**

Desrosier NW and Desrusier JN (1987) The Technology of Food Preservation, CBS Publishers and Distributors New Delhi

**Reference Books:**

Srivastava, R P and Kumar S (1998) Fruit and Vegetable preservation-Principles and practices. CBS Publishers and Distributors, New Delhi

<b>Credit Distribution</b>		
<b>Theory</b>	<b>Practical</b>	<b>Experiential Learning</b>
<b>88</b>	<b>-</b>	<b>32</b>
		<b>Learning the techniques for handling a food processing industry</b>

<b>Course: Major</b>	<b>Level of Course: 200</b>	<b>Scheme of Evaluation: (T)</b>
<b>Title of Paper: Therapeutic Nutrition I</b>		<b>Subject Code: NDC152M402</b>
<b>L-T-P-C: 4-1-0-5</b>		<b>Total credits: 5</b>

**Course Objectives**

To understand the role of therapeutic nutrition and types of therapeutic diets.

**Course Outcomes**

<b>On successful completion of the course the students will be able to:</b>		
<b>CO</b>	<b>Course Outcome</b>	<b>Blooms Taxonomy Level</b>
<b>CO 1</b>	<b>Relate</b> the significance of therapeutic nutrition.	<b>BT 1</b>
<b>CO 2</b>	<b>Explain</b> the need for therapeutic diet based on requirement.	<b>BT 2</b>
<b>CO 3</b>	<b>Develop</b> understanding of different therapeutic diets and their relation with improving and maintain health.	<b>BT 3</b>
<b>CO 4</b>	<b>Analyse</b> the effects of therapeutic diets on different health conditions.	<b>BT 4</b>

**Course Outline**

<b>Modules</b>	<b>Topics (if applicable) &amp; Course Contents</b>	<b>Periods</b>
<b>I.</b>	<b>Introduction to medical nutrition therapy-</b> definition and role of dietician in healthcare, nutrition care process (nutritional assessment, nutritional diagnosis, nutritional intervention, nutrition monitoring and evaluation, documentation),	<b>15</b>

	patient care and counselling.	
<b>II.</b>	<b>Adaptation of therapeutic diets-</b> routine hospital diet (normal or general diets, liquid diets, soft diets, bland diets), mode of feeding (oral feeding, tube or enteral feeding, peripheral vein feeding, total parental nutrition).	<b>15</b>
<b>III.</b>	<b>Therapeutic diets for gastrointestinal diseases-</b> gastroesophageal reflux disorder (GERD), indigestion, peptic ulcer, constipation, diarrhoea, inflammatory bowel diseases.	<b>15</b>
<b>IV.</b>	<b>Therapeutic diets for metabolic disorders-</b> diabetes mellitus (type I DM, type II DM, gestational DM), hypertension, gout, risk factors, management and prevention.	<b>15</b>
	<b>TOTAL</b>	<b>60</b>
	<b>Pedagogy: Lectures, Assignments, Seminars</b>	

**Text books:**

1. Joshi, S.A., Nutrition and Dietetics, Tata McGraw Hill Publications, New Delhi, 2004. 2. Srilakshmi B., Dietetics, New Age International (P) limited Publications, 2004
2. 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. 5<sup>th</sup> edition. Jones and Bartlett publishers. Canada.
2. B Srilakshmi. 2014. Dietetics. 9<sup>th</sup> edition, New Age International publishers.

<b>Credit Distribution</b>		
<b>Theory</b>	<b>Practical</b>	<b>Experiential Learning</b>
<b>88</b>	-	<b>32</b>
		<b>Planning diets for therapeutic conditions in hospital setup</b>

<b>Course: Major</b>	<b>Level of Course: 200</b>	<b>Scheme of Evaluation: (T)</b>
<b>Title of Paper: Innovative Product Development</b>		<b>Subject Code:</b>
<b>L-T-P-C: 4-0-2-5</b>		<b>NDC152M403/ NDC152M411</b>
		<b>Total credits: 5</b>

**Course Objectives**

To introduce the students with insight for design, development, standardization, regulatory aspects and commercialization of food products.

## Course Outcomes

On successful completion of the course the students will be able to:		
CO	Course Outcome	Blooms Taxonomy Level
CO 1	Relate the principle of food product development	BT 1
CO 2	Explain the importance of quality control and food safety.	BT 2
CO 3	Develop novel nutrient dense food products.	BT 3
CO 4	Analyse the different government scheme and regulations for food safety.	BT 4

## Course Outline

Modules	Topics (if applicable) & Course Contents	Periods
I.	<b>Introduction to Food Product Development</b> Overview of Food Product Development- Definition and importance of food product development, Stages of the product development process Market Research and Consumer Trends- Conducting market research to identify consumer needs, Analyzing current food trends and innovations Idea Generation and Concept Development- Techniques for brainstorming and idea generation, Developing product concepts based on research findings	15
II.	<b>Formulation and Nutritional Considerations</b> Ingredients and Formulation- Selecting ingredients for innovative food products, Understanding the role of functional ingredients Nutritional Analysis- Conducting nutritional analysis of food products, Ensuring nutritional adequacy and compliance with dietary guidelines Sensory Evaluation- Methods for sensory evaluation of food products, Importance of taste, texture, and appearance in product development	15
III.	<b>Food Safety and Regulatory Compliance</b> Food Safety Standards- Understanding food safety regulations and standards, Implementing Hazard Analysis Critical Control Point (HACCP) principles Labeling and Packaging- Importance of labeling in food product development, Designing packaging that meets regulatory requirements and attracts consumers Marketing Strategies- Developing marketing strategies for new food products, Positioning products in the market and understanding consumer behaviour	15
IV.	<b>Practical Applications in Food Product Development</b> Hands-on Product Development- Practical sessions on developing innovative food products, Experimenting with formulations and ingredient combinations Sensory Testing and Feedback- Conducting sensory tests with peers and gathering feedback, Analyzing feedback to refine product formulations Final Presentation- Presenting the developed food product to the class, Discussing the development process, challenges, and outcomes	15
	<b>TOTAL</b>	<b>60</b>
	<b>Pedagogy: Lectures, Assignments, Seminars</b>	

### Text Books:

Gordon W Fuller, "New Food Product Development: From Concept to Marketplace", 3rd Edition, CRC press, Taylor and Francis Group, UK, 2016.

**Reference Books:**

Catherine Side., "Food Product Development: Based on Experience", 2nd Edition, Iowa State Press, Blackwell publications, 2008.

<b>Credit Distribution</b>		
<b>Theory</b>	<b>Practical</b>	<b>Experiential Learning</b>
<b>88</b>	<b>-</b>	<b>32</b>
		<b>Developing and evaluating new nutrient rich food products</b>

<b>Course: Major</b>	<b>Level of Course: 200</b>	<b>Scheme of Evaluation: (P)</b>
<b>Title of Paper: Practical on Food Processing and Therapeutic Nutrition</b>		
<b>Subject Code: NDC152M412</b>		
<b>L-T-P-C: 0-0-8-4</b>	<b>Total credits: 4</b>	

**Course Objectives**

To develop practical skills of the students required to work in food processing industry and be able to plan diets for therapeutic conditions.

**Course Outcomes**

<b>On successful completion of the course the students will be able to:</b>		
<b>CO</b>	<b>Course Outcome</b>	<b>Blooms Taxonomy Level</b>
<b>CO 1</b>	<b>Define</b> the basic terms related to food processing and therapeutic nutrition.	<b>BT 1</b>
<b>CO 2</b>	<b>Classify</b> the different methods used for food processing	<b>BT 2</b>
<b>CO 3</b>	<b>Construct</b> different therapeutic diets based on health condition.	<b>BT 3</b>
<b>CO 4</b>	<b>Analyse</b> the nutritive value of the planned diets	<b>BT 4</b>

**Course Outline**

<b>Modules</b>	<b>Topics (if applicable) &amp; Course Contents</b>	<b>Periods</b>
<b>I.</b>	<b>Processing of cereals, pulses and their products-</b> soaking, drying, grinding, parboiling, boiling, malting, fermentation.	<b>22</b>
<b>II.</b>	<b>Processing of fruits, vegetables and their products-</b> blanching, , canning, drying, dehydration, freezing, frying.	<b>24</b>

	<b>Processing of milk and milk products-</b> fermentation, pasteurization.	
<b>III.</b>	<b>Planning diet for gastrointestinal diseases-</b> gastroesophageal reflux disorder (GERD), indigestion, peptic ulcer, constipation, diarrhoea, inflammatory bowel diseases.	<b>22</b>
<b>IV.</b>	<b>Planning diet for metabolic disorders-</b> diabetes mellitus (type I DM, type II DM, gestational DM), hypertension, gout.	<b>22</b>
	<b>TOTAL</b>	<b>90</b>
	<b>Pedagogy: Lectures, Assignments, Seminars</b>	

**Text books:**

1. Srivastava, R P and Kumar S (1998) Fruit and Vegetable preservation-Principles and practices. CBS Publishers and Distributors, New Delhi
2. Joshi, S.A., Nutrition and Dietetics, Tata McGraw Hill Publications, New Delhi, 2004.
2. Srilakshmi B., Dietetics, New Age International (P) limited Publications, 2004

**Reference books:**

1. Desrosier NW and Desrusier JN (1987) The Technology of Food Preservation, CBS Publishers and Distributors New Delhi
2. Peggy S. Stanfield, Peggy Stanfield, Y. H. Hui. 2010. Nutrition and Diet Therapy: Self- Instructional Approaches. 5<sup>th</sup> edition. Jones and Bartlett publishers. Canada.
3. B Srilakshmi. 2014. Dietetics. 9<sup>th</sup> edition, New Age International publishers.

<b>Course: Minor</b>	<b>Level of Course: 200</b>	<b>Scheme of Evaluation: (T)</b>
<b>Title of Paper: Food Product Development</b>		<b>Subject Code: NDC152N401</b>
<b>L-T-P-C: 3-0-0-3</b>		<b>Total credits: 3</b>

**Course Objectives**

To introduce the students with insight for design, development, standardization, regulatory aspects and commercialization of food products.

**Course Outcomes**

<b>On successful completion of the course the students will be able to:</b>		
<b>CO</b>	<b>Course Outcome</b>	<b>Blooms Taxonomy Level</b>
<b>CO 1</b>	<b>Relate</b> the principle of food product development	<b>BT 1</b>
<b>CO 2</b>	<b>Explain</b> the importance of quality control and food safety.	<b>BT 2</b>
<b>CO 3</b>	<b>Develop</b> novel nutrient dense food products.	<b>BT 3</b>

<b>CO 4</b>	<b>Analyse</b> the different government scheme and regulations for food safety.	<b>BT 4</b>
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### Course Outline

<b>Modules</b>	<b>Topics (if applicable) &amp; Course Contents</b>	<b>Periods</b>
<b>I.</b>	<b>New food products development-</b> Introduction to new products, customers and consumers, value addition, and market; <b>Designing new products-</b> New Food Product Development (NPD) process and activities; Recipe development; Selection of materials/ingredients for specific purposes; Modifications for production on large scale, cost-effectiveness, nutritional needs.	<b>15</b>
<b>II.</b>	<b>Standardization and large scale production-</b> Process design; Sensory evaluation; Food testing lab requirements; Comparison of market samples.	<b>15</b>
<b>III.</b>	<b>Quality, Safety &amp; Regulatory aspects-</b> Product stability; Evaluation of shelf life; Changes in sensory attributes and effects of environmental conditions; Developing packaging systems for maximum stability and cost effectiveness; Regulatory aspects: regulatory aspects of FSSAI for a food product.	<b>15</b>
<b>IV.</b>	<b>Marketing characteristics of new products-</b> product life cycle and profit picture: Opportunities in the marketplace for new product development, technological advances driving new product development, government's role in new product development.	<b>15</b>
	<b>TOTAL</b>	<b>60</b>
	<b>Pedagogy: Lectures, Assignments, Seminars</b>	

#### Text Books:

Gordon W Fuller, "New Food Product Development: From Concept to Marketplace", 3rd Edition, CRC press, Taylor and Francis Group, UK, 2016.

#### Reference Books:

Catherine Side., "Food Product Development: Based on Experience", 2nd Edition, Iowa State Press, Blackwell publications, 2008.

<b>Credit Distribution</b>		
<b>Theory</b>	<b>Practical</b>	<b>Experiential Learning</b>
<b>88</b>	-	<b>32</b>
		<b>Developing and evaluating new nutrient rich food products</b>

<b>Course: Minor</b>	<b>Level of Course: 200</b>	<b>Scheme of Evaluation: (T)</b>
<b>Title of Paper: Sensory Evaluation</b>		<b>Subject Code: NDC152N402</b>
<b>L-T-P-C: 3-0-0-3</b>		<b>Total credits: 3</b>

## Course Objectives

To introduce the students with insight for development, standardization and evaluating sensory aspects of food products.

## Course Outcomes

On successful completion of the course the students will be able to:		
CO	Course Outcome	Blooms Taxonomy Level
CO 1	Relate the basic anatomy and physiology of the sensory organs used to evaluate food.	BT 1
CO 2	Explain the practical skills and techniques used to analyse the sensory properties of food	BT 2
CO 3	Develop sensory methods to product development and communicating sensory messages.	BT 3
CO 4	Analyse the ability to identify solutions to problems related to the sensory analysis of food.	BT 4

## Course Outline

Modules	Topics (if applicable) & Course Contents	Periods
I.	<b>Introduction:</b> Definition of sensory evaluation; basic tastes; human senses and sensory perception; threshold; psychophysics, Tongue surface	15
II.	<b>Arrangements for Sensory Evaluation Test controls:</b> Environment and test room design; product controls: sample preparation and presentation; panelist controls; factors influencing measurements: psychological and physiological errors	15
III.	<b>Methods for Sensory Evaluation:</b> Classification of test methods; discrimination tests: paired-comparison, duo-trio and triangle tests; affective tests: qualitative (interview and focus group) and quantitative tests (paired preference and acceptance tests); Two sample test, Ranking test, Two sample difference test, numeric scoring test, hedonic ranking test	15
IV.	<b>Subjective and objective methods:</b> Texture analyser- mechanical characteristics- chewiness, brittleness, and geometric characteristics, Sensory panel-types-criteria for panel selection	15
	<b>TOTAL</b>	<b>60</b>
	<b>Pedagogy: Lectures, Assignments, Seminars</b>	

## Text Books:

Gordon W Fuller, "New Food Product Development: From Concept to Marketplace", 3rd Edition, CRC press, Taylor and Francis Group, UK, 2016.

**Reference Books:**

Catherine Side., "Food Product Development: Based on Experience", 2nd Edition, Iowa State Press, Blackwell publications, 2008

<b>Credit Distribution</b>		
<b>Theory</b>	<b>Practical</b>	<b>Experiential Learning</b>
<b>88</b>	<b>-</b>	<b>32</b>
		<b>Learning evaluation process and using sensory evaluation for evaluating a food product</b>

## Semester V

<b>Course:Major</b>	<b>Level of Course:300</b>	<b>Scheme of Evaluation:(T)</b>
<b>Title of Paper: Therapeutic Nutrition -II</b>	<b>Subject Code: NDC152M501</b>	
<b>L-T-P-C:3-1-0-4</b>	<b>Total credits:4</b>	

### 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:		
CO	Course Outcome	Blooms Taxonomy Level
CO 1	<b>Remember</b> the factors to consider in dietary management in certain diseased conditions	<b>BT 1</b>
CO 2	<b>Understand</b> the effect of various disorders / diseases on nutritional status, nutritional and dietary requirements	<b>BT 2</b>
CO 3	<b>Apply</b> knowledge in dietary management through dietary modification and adaptations in diseases state.	<b>BT 3</b>
CO 4	<b>Analyse</b> the different diet related situations in diseased conditions.	<b>BT 4</b>
CO 5	<b>Evaluate</b> the various disorders / diseases on nutritional status, and their dietary & nutritional requirements dietary requirements	<b>BT 5</b>

### Course Outline

Modules	Topics (if applicable) & Course Contents	Periods
<b>I.</b>	<b>Therapeutic diets for coronary heart disease (CHD)</b> - dyslipidemia, arteriosclerosis, hypertension, angina pectoris, myocardial infarction, congestive cardiac failure, heart attack. <b>Therapeutic diets for liver disorders</b>	<b>15</b>
<b>II.</b>	<b>Therapeutic diets for renal diseases (RD)</b> -acute and chronic nephritis, nephrotic syndrome, acute renal failure, chronic renal failure, end stage renal disease, renal calculi.	<b>15</b>
<b>III.</b>	<b>Therapeutic diets for neurological disorders</b> - common neurological disorders, physiological aspects of the CNS, feeding and nutritional issues, dysphagia, alzheimers, Parkinson, epilepsy, neurotrauma, spinal trauma.	<b>15</b>

<b>IV.</b>	<b>Therapeutic diets for stress, burns and surgery-</b> introduction, nutritional requirement during stress, degree of burns (1st, 2nd and 3rd), diet, nutritional assessment, complications, nutritional care of patients with burns, principles of diet therapy, accidental injury- nutritional care and nutrition needed, surgery- nutrients needed, post- operative diet.	<b>15</b>
	<b>TOTAL</b>	<b>60</b>
	<b>Pedagogy: Lectures, Assignments, Seminars</b>	

**Textbooks:**

1. Joshi,S.A.,Nutrition and Dietetics, Tata Mc Graw Hill Publications, New Delhi, 2004.
2. Srilakshmi B., Dietetics, New Age International (P) limited Publications, 2004
3. 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. 5<sup>th</sup>edition. Jones and Bartlett publishers. Canada.
2. B. Srilakshmi, Dietetics. 9<sup>th</sup>edition, New Age International publishers. 2014.

<b>Credit Distribution</b>		
<b>Theory</b>	<b>Practical</b>	<b>Experiential Learning</b>
<b>88</b>	-	<b>32</b>
		<b>Practicing therapeutic nutrition, contributing to optimal patient care and outcomes in various healthcare settings.</b>

<b>Course:Major</b>	<b>Level of Course:300</b>	<b>Scheme of Evaluation:(T)</b>
<b>Title of Paper: Food Standards and Quality Control</b>	<b>Subject Code:NDC152M502</b>	
<b>L-T-P-C:3-1-0-4</b>	<b>Total credits:4</b>	

**Course Objective:**

To understand the concept of food adulteration, food preservation and food standardization.

**Course outcomes:**

On successful completion of the course the students will be able to:		
CO	Course Outcome	Blooms Taxonomy Level
CO 1	<b>Remember</b> food standardization and regulation agencies in India	<b>BT 1</b>
CO 2	<b>Understand</b> the importance of food packaging and labelling	<b>BT 2</b>
CO 3	<b>Apply</b> the principles of food preservation techniques in daily life	<b>BT 3</b>
CO 4	<b>Analyse</b> the various steps of HACCP in food in food industry.	<b>BT 4</b>
CO 5	<b>Evaluate</b> the physical, chemical and microbiological food spoilage.	<b>BT 5</b>

**Course Outline**

Modules	Topics(if applicable) & Course Contents	Periods
I.	<b>Food adulteration</b> – definition of adulteration, adulterants, types of adulterants, food laws – PFA act, essential commodities act, FPO act, milk and milk products order.	15
II.	<b>Food standardization and regulation agencies in India</b> - agencies at state level, central food laboratories, HACCP, powers of food inspector, food spoilage -physical, chemical and microbiological spoilage of foods.	15
III.	<b>Food packaging and labeling</b> - food packaging – definition, functions, classification, laws related to packaging, food labeling: standards, purpose, description types of labels, labeling regulation barcode, nutrition labeling, health claims, and mandatory labeling provision.	15
IV.	<b>Food preservation:</b> Introduction to food preservation- methods of preservation, general principles and applications of food preservation, preservation by use of temperature -- preservation by use of high and low temperature, preservation by drying- preservation by drying and use of salt and sugar, enhancement of foods – food fortification, enrichment, supplementation, fermentation, germination, pre- and probiotics and organic foods.	15
	<b>TOTAL</b>	<b>60</b>
	<b>Pedagogy: Lectures, Assignments, Seminars</b>	

**Textbooks:**

1. Mathur, P., Food Safety and Quality Control, Orient BlackSwan, 2018.
2. Dave, S. et al., Principles of Food Safety and Quality Management, Gyaniversity Publications, 2024.

**Reference Books:**

1. Ramaswamy, A., Food Science and Quality Control, Book Enclave, 2023.

<b>Credit Distribution</b>		
<b>Theory</b>	<b>Practical</b>	<b>Experiential Learning</b>
<b>88</b>	<b>-</b>	<b>32</b>
		<b>Implementing food standards and checking adulteration in regular food available in the market</b>

<b>Course:Major</b>	<b>Level of Course:300</b>	<b>Scheme of Evaluation:(T)</b>
<b>Title of Paper: Food hygiene and Sanitation</b>		<b>Subject Code: NDC152M503</b>
<b>L-T-P-C:3-1-0-4</b>		<b>Total credits:4</b>

**Course Objective:**

To understand the food hygiene and sanitation practises at different levels of food handlings.

**Course outcomes:**

<b>On successful completion of the course the students will be able to:</b>		
<b>CO</b>	<b>Course Outcome</b>	<b>Blooms Taxonomy Level</b>
<b>CO 1</b>	<b>Remember</b> the hazards and food borne illness	<b>BT 1</b>
<b>CO 2</b>	<b>Understand</b> the effect of food sanitation on different sectors	<b>BT 2</b>
<b>CO 3</b>	<b>Apply</b> the principles of sanitation and food hygiene at various stages of food handling.	<b>BT 3</b>
<b>CO 4</b>	<b>Analyse</b> the public health hazards caused by compromised hygiene and sanitation.	<b>BT 4</b>
<b>CO 5</b>	<b>Evaluate</b> the various food borne diseases and related global health and economic impacts	<b>BT 5</b>

**Course Outline**

<b>Modules</b>	<b>Topics (if applicable) &amp; Course Contents</b>	<b>Periods</b>
<b>I.</b>	<b>Food Hygiene and Sanitation-</b> concept of food hygiene and sanitation at different levels of food handling. • Personal hygiene and hand hygiene • Environmental hygiene • Sanitation and hygiene during food handling practices (preparing, cooking and handling food and utensils) • Food hygiene at food service institutions • Food waste management	<b>15</b>

<b>II.</b>	<b>Public health hazards</b> - Food infection, intoxication and poisoning – symptoms, mode of transmission, and prevention • Food storage (selection, purchase and storage of perishable, semi-perishable and non-perishable foods) • Principles and methods of food preservation	<b>15</b>
<b>III.</b>	<b>Food Spoilage and Food borne Illnesses</b> - Food borne diseases and related global health and economic impacts Transmission of pathogens through food Contribution factors to the prevalence of food borne illnesses Prevention of food borne illnesses/ outbreaks (Flow diagrams)	<b>15</b>
<b>IV.</b>	<b>Strategies and Partnership in Food Sanitation</b> - Health sector, Education sector, Tourism sector, Food and health inspector, Mass media, Food industry, Community.	<b>15</b>
	<b>TOTAL</b>	<b>60</b>
	<b>Pedagogy: Lectures, Assignments, Seminars</b>	

**Textbooks:**

1. Roday. S., Food Hygiene and Sanitation, Mc Graw Hill India, 2011.
2. Kumar. A., Fundamentals of Food Hygiene, Safety and Quality, Dreamtech Press, 2019.

**Reference books:**

1. Mariott, G, N., Principles of Food Sanitation, Springer, 6<sup>th</sup> Edition, 2018.

<b>Credit Distribution</b>		
<b>Theory</b>	<b>Practical</b>	<b>Experiential Learning</b>
<b>88</b>	-	<b>32</b>
		<b>Implementing food hygiene and sanitation principles and practices ensuring food safety from production to consumption.</b>

<b>Course: Major</b>	<b>Level of Course: 300</b>	<b>Scheme of Evaluation: (T)</b>
<b>Subject Name: Research Methodology</b>		<b>Subject Code: NDC152M504</b>
<b>Credit Units: 3-1-0-4</b>		<b>Total credit: 4</b>

**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:**

<b>On successful completion of the course the students will be able to:</b>		
<b>CO</b>	<b>Course Outcome</b>	<b>Blooms Taxonomy Level</b>
<b>CO 1</b>	<b>Remember</b> the steps and sampling methods of research design and various methods of data design.	<b>BT 1</b>
<b>CO 2</b>	<b>Understand</b> the graphical representation of research methods and	<b>BT 2</b>
<b>CO 3</b>	<b>Apply</b> knowledge about probability and distribution factors.	<b>BT 3</b>
<b>CO 4</b>	<b>Analyse</b> the measures of central tendency (mean, mode)for grouped and ungrouped data.	<b>BT 4</b>
<b>CO 5</b>	<b>Evaluate</b> the measures of sigma scores, standard scores ,percentiles and calculation and interpretation of statistical procedures.	<b>BT 5</b>

**Detailed Syllabus:**

<b>Modules</b>	<b>Topics / Course content</b>	<b>Periods</b>
<b>I</b>	<b>Introduction to research</b> :Significance, Purpose and Types of Research , Ethics in Research, Plagiarism	<b>12</b>
<b>II</b>	<b>Research Design</b> – steps ,Sampling Methods and Scaling Techniques , Research Tools and Methodology of Data Collection , Databases in Food Research	<b>12</b>
<b>III</b>	<b>Research data presentation</b> : Variables in Research and Scales of Measurement , Tabulation of Research Data ,Graphical Presentation of Data – use of Excel and Statistical Software , Scientific Report Writing	<b>12</b>
<b>IV</b>	<b>Related research concepts</b> :Probability – Theoretical and Conditional ,Gaussian Curve ,Binomial Distribution , Poisson Distribution , Density Functions , Vital Statistics and Life Tables	<b>12</b>
<b>Total</b>		<b>48</b>
<b>Pedagogy: Lectures, Assignments, Seminars</b>		

**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.

<b>Course:Major</b>	<b>Level of Course:300</b>	<b>Scheme of Evaluation:(P)</b>
<b>Title of Paper: Practical on Therapeutic &amp; Clinical Nutrition</b>	<b>Subject Code:NDC152M511</b>	
<b>L-T-P-C:3-1-0-4</b>	<b>Total credits:4</b>	

**Course Objective:**

To understand the importance of therapeutic diets in various disease conditions and identification of food adulterants.

**Course outcomes:**

<b>On successful completion of the course the students will be able to:</b>		
<b>CO</b>	<b>Course Outcome</b>	<b>Blooms Taxonomy Level</b>
<b>CO 1</b>	<b>Remember</b> the different diseases and co-morbidities	<b>BT 1</b>
<b>CO 2</b>	<b>Understand</b> the dietary requirements in different disease conditions	<b>BT 2</b>
<b>CO 3</b>	<b>Apply</b> the practical knowledge of planning and preparing diets	<b>BT 3</b>
<b>CO 4</b>	<b>Analyse</b> the presence and effects of various food adulterants	<b>BT 4</b>
<b>CO 5</b>	<b>Evaluate</b> the presence of food adulterants using laboratory techniques	<b>BT 5</b>

**Course Outline**

<b>Modules</b>	<b>Topics (if applicable) &amp; Course Contents</b>	<b>Periods</b>
<b>I.</b>	<b>Planning and preparation of diet plans for different disease condition-</b> coronary heart disease, renal disease	<b>15</b>
<b>II.</b>	<b>Planning and preparation of diet plans for different disease condition-</b> neurological disorders.	<b>15</b>
<b>III.</b>	<b>Planning and preparation of diet plans for different disease condition-</b> stress, burns and surgery.	<b>15</b>

<b>IV.</b>	<b>Identification of food adulterants present in common food items-</b> grains, milk and milk products, spices and condiments, fruits and vegetables.	<b>15</b>
<b>TOTAL</b>		<b>60</b>
<b>Pedagogy: Lectures, Assignments, Seminars</b>		

**Recommended Texts:** As suggested under the theory papers

<b>Course:Minor</b>	<b>Level of Course:300</b>	<b>Scheme of Evaluation:(T)</b>
<b>Title of Paper: Basics of Food Toxicology</b>	<b>Subject Code:NDC152N501</b>	
<b>L-T-P-C:3-1-0-4</b>	<b>Total credits:4</b>	

**Course Objective:**

To understand the concept of food safety and toxicology leading to health hazards.

**Course outcomes:**

<b>On successful completion of the course the students will be able to:</b>		
<b>CO</b>	<b>Course Outcome</b>	<b>Blooms Taxonomy Level</b>
<b>CO 1</b>	<b>Remember</b> thenaturally occurring toxicants & food contaminants	<b>BT 1</b>
<b>CO 2</b>	<b>Understand</b> the ethical issues related to food toxicology research and risk assessment	<b>BT 2</b>
<b>CO 3</b>	<b>Apply</b> toxicological principles to improve overall food safety	<b>BT 3</b>
<b>CO 4</b>	<b>Analyse</b> biochemical and physiological effects of toxicants on the body	<b>BT 4</b>
<b>CO 5</b>	<b>Evaluate</b> the potential health hazards associated with food toxicants	<b>BT 5</b>

**Course Outline**

<b>Modules</b>	<b>Topics (if applicable) &amp; Course Contents</b>	<b>Periods</b>
<b>I.</b>	<b>Introduction to food safety and Toxicology:</b> Hazards-Microbiological, Nutritional, Environmental, Assessment of Food Safety, Risk assessment and risk benefit, Acute toxicity, Mutagenicity and carcinogenicity, Reproductive and development toxicity, Neurotoxicity and behavioural effects, Immunotoxicity	<b>15</b>

<b>II.</b>	<b>Naturally occurring toxicants &amp; food contaminants:</b> Sea food toxins, mutagens & carcinogens in heated & processed foods, coffee & methylxanthines, toxicity of mushrooms alkaloids compounds, glucosinolates, protease inhibitors, phytate.	<b>15</b>
<b>III.</b>	<b>Food additives as toxicants:</b> Sweeteners; toxicants formed during food processing such as maillard reaction products acrylamide, benzene; risk of genetically modified food, food supplements, persistent organic pollutants.	<b>15</b>
<b>IV.</b>	<b>Agricultural and industrial contaminants in foods:</b> pesticides residues in fruits and vegetables, metal contaminants in foods and their toxicity in human body; animal drug residues in food and water, dioxins and related compounds in food; metals such as lead, arsenic and mercury.	<b>15</b>
	<b>TOTAL</b>	<b>60</b>
	<b>Pedagogy: Lectures, Assignments, Seminars</b>	

**Textbooks:**

1. Winter. K C., Food Toxicology, Taylor and Francis Inc, 2000.
2. Altug. T., Introduction to Toxicology and Food, Taylor and Francis Inc, 2002.

**Reference Books:**

1. Omaye. T, S., Food and Nutritional Toxicology, Taylor and Francis Inc, 1<sup>st</sup> Edition, 2004.

<b>Credit Distribution</b>		
<b>Theory</b>	<b>Practical</b>	<b>Experiential Learning</b>
<b>88</b>	-	<b>32</b>
		<b>Identifying and evaluating potential toxic substances in food to ensure consumer safety.</b>

## Semester VI

<b>Course: Major</b>	<b>Level of Course:300</b>	<b>Scheme of Evaluation:(T)</b>
<b>Title of Paper: Nutrition through lifecycle</b>	<b>Subject Code:NDC152M601</b>	
<b>L-T-P-C:3-1-0-4</b>	<b>Total credits:4</b>	

### Course Objective:

To understand the nutritional needs at different life stages along with the physiological changes from infancy to elderly.

### Course outcomes:

<b>On successful completion of the course the students will be able to:</b>		
<b>CO</b>	<b>Course Outcome</b>	<b>Blooms Taxonomy Level</b>
<b>CO 1</b>	<b>Remember</b> physiological changes that occur throughout life and their impact on nutrition.	<b>BT 1</b>
<b>CO 2</b>	<b>Understand</b> nutrition-related public health issues and interventions across the lifecycle.	<b>BT 2</b>
<b>CO 3</b>	<b>Apply</b> skills to evaluate nutrition information in real-life scenarios.	<b>BT 3</b>
<b>CO 4</b>	<b>Analyse</b> how cultural factors affect nutrition practices across the lifespan.	<b>BT 4</b>
<b>CO 5</b>	<b>Evaluate</b> how proper nutrition can promote health and prevent diseases at each life stage.	<b>BT 5</b>

### Course Outline

<b>Modules</b>	<b>Topics (if applicable) &amp; Course Contents</b>	<b>Periods</b>
<b>I.</b>	<b>Nutrition during Pregnancy and Lactation:</b> Prenatal growth and development, Nutritional requirements, RDA, pregnancy and diet, complications of pregnancy, Breast feeding- Colostrum and mature milk. Advantages of breast feeding, need and criteria for using expressed human milk.	<b>15</b>
<b>II.</b>	<b>Nutrition during Infancy:</b> 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. <b>Nutrition in Preschool children:</b> 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.	<b>15</b>
<b>III.</b>	<b>Nutrition in School children:</b> Nutritional requirements, RDA, Feeding problems, Packed lunches, Supplementary foods. <b>Nutrition in Adolescents:</b> Growth and development, Nutritional requirements, RDA, Nutritional problems- eating disorders, predisposition to osteoporosis,	<b>15</b>

	anaemia, pre-menstrual syndrome, mal nutrition (overnutrition and undernutrition) due to early pregnancy..	
<b>IV.</b>	<b>Nutrition in Adults:</b> Growth and development, Nutritional requirements, RDA. <b>Nutrition in Old age:</b> General physiological changes, Theories on the causes of aging, Nutritional requirements, Nutrition related problems of old age, Degenerative diseases.	<b>15</b>
	<b>TOTAL</b>	<b>60</b>
	<b>Pedagogy: Lectures, Assignments, Seminars</b>	

**Textbooks:**

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

**Reference books:**

1. Bamji. S. M, et al; Textbook of Human Nutrition, 2<sup>nd</sup> Edition, Oxford and IBH Publishing Co. Pvt. Ltd., 2003.

<b>Credit Distribution</b>		
<b>Theory</b>	<b>Practical</b>	<b>Experiential Learning</b>
<b>88</b>	-	<b>32</b>
		<b>Developing skills to evaluate nutrition information and apply it to real-life scenarios.</b>

<b>Course: Major</b>	<b>Level of Course:300</b>	<b>Scheme of Evaluation:(T)</b>
<b>Title of Paper: Community Nutrition</b>		<b>Subject Code: NDC152M602</b>
<b>L-T-P-C:3-1-0-4</b>		<b>Total credits:4</b>

**Course Objective:**

To understand community health and methods to assess nutritional status and needs at a community level.

**Course outcomes:**

<b>On successful completion of the course the students will be able to:</b>		
<b>CO</b>	<b>Course Outcome</b>	<b>Blooms Taxonomy Level</b>
<b>CO 1</b>	<b>Remember</b> nutrition-related policies and their impact on community health.	<b>BT 1</b>

<b>CO 2</b>	<b>Understand</b> how cultural diversity influences dietary practices and nutrition education.	<b>BT 2</b>
<b>CO 3</b>	<b>Apply</b> skills to design, implement, and evaluate community nutrition programs.	<b>BT 3</b>
<b>CO 4</b>	<b>Analyse</b> the role of nutrition in public health and community well-being, the lifespan.	<b>BT 4</b>
<b>CO 5</b>	<b>Evaluate</b> how environmental issues affect food systems and community nutrition.	<b>BT 5</b>

### Course Outline

<b>Modules</b>	<b>Topics (if applicable) &amp; Course Contents</b>	<b>Periods</b>
<b>I.</b>	<b>Concept of Public Health Nutrition:</b> Understanding the terms, nutrition, health, healthcare, Role of public health nutrition in community, Public health nutrition- multidisciplinary concept <b>Nutritional problems: Protein Energy Malnutrition (PEM)-</b> Prevalence, causes, consequences, threat and prevention, Micronutrient deficiencies.	<b>15</b>
<b>II.</b>	<b>Methods of nutritional assessment</b> (Direct and Indirect methods), Anthropometric assessment, Biochemical assessment, Clinical assessment, Dietary assessment	<b>15</b>
<b>III.</b>	<b>Nutrition policies and programmes:</b> National nutrition programmes (ICDS), Supplementary feeding programmes, nutrition deficiency control programmes, food security programmes	<b>15</b>
<b>IV.</b>	<b>Strategies to combat public health nutrition problems:</b> food based strategies, dietary diversification, food fortification, and nutrition and health education, immunization, implementation of nutritional education programmes, identifying the target audience, designing messages, choosing medium multimedia.	<b>15</b>
	<b>TOTAL</b>	<b>60</b>
	<b>Pedagogy: Lectures, Assignments, Seminars</b>	

### Textbooks:

1. Wadhwa, *et al*; Textbook of Public Nutrition, IGNOU, New Delhi, 2013.
2. Das. S, Textbook of Community Nutrition, 4<sup>th</sup> Edition, Academia Publisher.

### Reference Books:

1. Sehgal & Raghuvardhi, Textbook of Community Nutrition, 4<sup>th</sup> Edition, Indian Council of Agriculture Research, Pusa, 2000.

<b>Credit Distribution</b>		
<b>Theory</b>	<b>Practical</b>	<b>Experiential Learning</b>
<b>88</b>	-	<b>32</b>
		<b>Learning to identify and utilize available resources for community nutrition programs</b>

<b>Course: Major</b>	<b>Level of Course:300</b>	<b>Scheme of Evaluation:(T)</b>
<b>Title of Paper: Food Service Management</b>		<b>Subject Code: NDC152M603</b>
<b>L-T-P-C:3-1-0-4</b>		<b>Total credits:4</b>

**Course Objective:**

To understand regulations and ethical considerations in food service management and operations management in real- life scenario.

**Course outcomes:**

<b>On successful completion of the course the students will be able to:</b>		
<b>CO</b>	<b>Course Outcome</b>	<b>Blooms Taxonomy Level</b>
<b>CO 1</b>	<b>Remember</b> budgeting, cost control, and financial analysis techniques specific to food service operations.	<b>BT 1</b>
<b>CO 2</b>	<b>Understand</b> principles of kitchen layout, equipment selection, and maintenance.	<b>BT 2</b>
<b>CO 3</b>	<b>Apply</b> principles of food safety, hygiene, and sanitation in food service environments.	<b>BT 3</b>
<b>CO 4</b>	<b>Analyse</b> effective strategies for purchasing, receiving, storing, and controlling inventory.	<b>BT 4</b>
<b>CO 5</b>	<b>Evaluate</b> nutritionally balanced and cost-effective menus.	<b>BT 5</b>

**Course Outline**

<b>Modules</b>	<b>Topics (if applicable) &amp; Course Contents</b>	<b>Periods</b>
<b>I.</b>	<b>Institutional Food Service Management:</b> Introduction to food management, tools of management, management of resources and spaces-kitchen spaces, storage spaces, service areas.	<b>15</b>
<b>II.</b>	<b>Food Management:</b> Characteristics of food, food purchasing, menu planning, food production, food service, clearing, cleaning and waste management.	<b>15</b>
<b>III.</b>	<b>Financial and Personnel management:</b> Costing and Budgeting, pricing, accounting, staff employment, employee benefits, staff training and development and legal aspects of personnel management.	<b>15</b>
<b>IV.</b>	<b>Hygiene Sanitation and Safety:</b> hygiene and sanitation, safety and security, deep cleaning, pest control <b>Marketing:</b> Marketing the products of catering and food service management challenges.	<b>15</b>
	<b>TOTAL</b>	<b>60</b>
	<b>Pedagogy: Lectures, Assignments, Seminars</b>	

**Textbooks:**

1. Sethi. M; Catering Management, Institutional Food Management: An Integrated Approach, New Age International Ltd. Publishers, 3<sup>rd</sup> Edition, 2015.

**Reference Books:**

1. Palacio. P. J, et. al; Foodservice Management: Principles and Practices, Pearson Education, 13<sup>th</sup> Edition, 2019.

<b>Credit Distribution</b>		
<b>Theory</b>	<b>Practical</b>	<b>Experiential Learning</b>
<b>88</b>	<b>-</b>	<b>32</b>
		<b>Learning techniques to promote food services and enhance customer experiences.</b>

<b>Course: Major</b>	<b>Level of Course:300</b>	<b>Scheme of Evaluation:(T)</b>
<b>Title of Paper: Nutraceuticals and functional foods</b>	<b>Subject Code: NDC152M604</b>	
<b>L-T-P-C:3-1-0-4</b>	<b>Total credits:4</b>	

**Course Objective:**

The course is designed to appraise the students to know about the importance of nutraceuticals and functional foods and their role in maintaining optimal health.

**Course Outcomes:**

<b>On successful completion of the course the students will be able to:</b>		
<b>CO</b>	<b>Course Outcome</b>	<b>Blooms Taxonomy Level</b>
<b>CO 1</b>	<b>Remember</b> the components of functional foods and foods containing	<b>BT 1</b>
<b>CO 2</b>	<b>Understand</b> the developments in the field of nutraceuticals and	<b>BT 2</b>
<b>CO 3</b>	<b>Apply</b> knowledge to improve the daily dietary intake by inclusion of functional foods in the diet.	<b>BT 3</b>
<b>CO 4</b>	<b>Analyse</b> the effects of nutrients in molecular level process in the body and the effect of phytochemicals in disease conditions.	<b>BT 4</b>
<b>CO 5</b>	<b>Evaluate</b> the importance of probiotics and prebiotics in human health	<b>BT 5</b>

### Detailed syllabus:

Modules	Topics / Course content	Periods
I	<b>Nutraceuticals:</b> Definition, history, classification, market trends, sources. Demand drivers for health supplements and nutraceuticals in India. Development of nutraceuticals incorporated food products- Tailoring diets for special needs, critical steps, stability and bio availability of bio actives substances in food matrices.	10
II	<b>Functional foods:</b> Definition, history and types, Health benefits of functional foods and future promises in Indian diet. Future research and develop of functional foods- Qualified studies, modern technologies and appropriate consumer communication. Safety and Regulatory aspects of functional foods.	12
III	<b>Probiotics and Prebiotics:</b> Definition, types, source and Health benefits. Recent advances in probiotics and prebiotics. FAO/WHO Standards/ guidelines on probiotics and prebiotics.	12
IV	<b>Carotenoids:</b> beta carotene, lycopene and lutein sources and uses. <b>Terpenes:</b> terpenoids, saponin, tocotriols- sources and uses. Curcumin for prevention and treatment of chronic diseases- Introduction, mechanism of action of curcumin, role of curcumin in cancer, CVDs, neurological diseases, pulmonary diseases, diabetes, rheumatic diseases and infection diseases.	14
<b>Total</b>		<b>48</b>

### Textbooks:

1. Dilip Ghosh et al (2006). Clinical aspects of functional foods and nutraceuticals, CRC Press
2. Mahtab S Bamji, N Prahlad Rao, Vinodini Reddy (2005). Text book of Human Nutrition -, Second Edition, Oxford and IBH Publishing Co. Pvt.Ltd.

### Reference books:

1. Wilman(2007). Hand book of Nutraceuticals and functional foods, second edition. CRC press.
2. Gibson GR and Williams CM (2000). Functional Foods - Concept to Product.

<b>Course: Major</b>	<b>Level of Course:300</b>	<b>Scheme of Evaluation:(P)</b>
<b>Title of Paper: Practical on Lifecycle Nutrition and Community Nutrition</b>		<b>Subject Code: NDC152M611</b>
<b>L-T-P-C:3-1-0-4</b>		<b>Total credits:4</b>

### Course Objective:

To understand regulations and ethical considerations in food service management and operations management in real- life scenario.

**Course outcomes:**

<b>On successful completion of the course the students will be able to:</b>		
<b>CO</b>	<b>Course Outcome</b>	<b>Blooms Taxonomy Level</b>
<b>CO 1</b>	<b>Remember</b> physiological changes that occur throughout life and their impact on nutrition.	<b>BT 1</b>
<b>CO 2</b>	<b>Understand</b> nutrition-related public health issues and interventions across the lifecycle.	<b>BT 2</b>
<b>CO 3</b>	<b>Apply</b> skills to design, implement, and evaluate diets for different stages of life.	<b>BT 3</b>
<b>CO 4</b>	<b>Analyse</b> the role of nutrition in public health and community well-being.the lifespan.	<b>BT 4</b>
<b>CO 5</b>	<b>Evaluate</b> how environmental issues affect food systems and community nutrition.	<b>BT 5</b>

**Course Outline**

<b>Modules</b>	<b>Topics (if applicable) &amp; Course Contents</b>	<b>Periods</b>
<b>I.</b>	<b>Planning and preparation of diets:</b> Preschool, school going and adolescents.	<b>15</b>
<b>II.</b>	<b>Planning and preparation of diets:</b> Pregnancy, Lactation and Old age.	<b>15</b>
<b>III.</b>	<b>Visit to primary schools:</b> Anganwadi schools, Anthropometric assessment and follow up Mid-Day Meal Programme.	<b>15</b>
<b>IV.</b>	<b>Visit to primary and secondary Schools for Clinical and Dietary Assessment.</b>	<b>15</b>
	<b>TOTAL</b>	<b>60</b>
	<b>Pedagogy: Lectures, Assignments, Seminars</b>	

**Textbooks:**

1. Wadhwa, et al; Textbook of Public Nutrition, IGNOU, New Delhi, 2013.
2. Srilakshmi. B; Dietetics, 7<sup>th</sup> Edition, New Age International (P) Limited Publishers, 2014.

**Reference Books:**

1. Sehgal &Raghuvardhi, Textbook of Community Nutrition, 4<sup>th</sup> Edition, Indian Council of Agriculture Research, Pusa, 2000.
2. Bamji. S. M, et al; Textbook of Human Nutrition, 2<sup>nd</sup> Edition, Oxford and IBH Publishing Co. Pvt. Ltd., 2003.

<b>Course: Minor</b>	<b>Level of Course:300</b>	<b>Scheme of Evaluation:(T)</b>
<b>Title of Paper: Animal products processing and utilization</b>		<b>Subject Code: NDC152N601</b>
<b>L-T-P-C:3-1-0-4</b>		<b>Total credits:4</b>

**Course Objective:**

To understand the need and importance of livestock, egg and poultry industry.

**Course outcomes:**

<b>On successful completion of the course the students will be able to:</b>		
<b>CO</b>	<b>Course Outcome</b>	<b>Blooms Taxonomy Level</b>
<b>CO 1</b>	<b>Remember</b> types of animal products available in the market.	<b>BT 1</b>
<b>CO 2</b>	<b>Understand</b> technology behind preparation of various animal food products and by-product utilization.	<b>BT 2</b>
<b>CO 3</b>	<b>Apply</b> skills in assessing organoleptic properties of processed animal products.	<b>BT 3</b>
<b>CO 4</b>	<b>Analyse</b> the appropriate packaging methods for different animal products.	<b>BT 4</b>
<b>CO 5</b>	<b>Evaluate</b> ethical issues related to animal product processing, including animal welfare.	<b>BT 5</b>

**Course Outline**

<b>Modules</b>	<b>Topics (if applicable) &amp; Course Contents</b>	<b>Periods</b>
<b>I.</b>	<b>Introduction to Animal Products:</b> Overview of major animal food sources, Slaughter and post-mortem changes, Processing methods: curing, smoking, fermentation	<b>15</b>
<b>II.</b>	<b>Poultry and Egg Processing:</b> Egg structure and composition, Processing of poultry meat and eggs, Quality control and safety measures <b>Dairy Science and Technology:</b> Milk composition and nutritional value, Dairy product processing: pasteurization, homogenization, Fermented dairy products: yogurt, cheese, kefir	<b>15</b>
<b>III.</b>	<b>Seafood Processing:</b> Types of seafood: fish, shellfish, mollusks, Handling and preservation techniques, Processing methods: canning, smoking, drying <b>Nutritional Analysis of Animal Products:</b> Macronutrient and micronutrient profiles, Effects of processing on nutritional value	<b>15</b>
<b>IV.</b>	<b>Food Safety and Quality Control:</b> Microbial hazards in animal products, HACCP principles in animal product processing, Regulatory standards and compliance	<b>15</b>
	<b>TOTAL</b>	<b>60</b>

	<b>Pedagogy: Lectures, Assignments, Seminars</b>	
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**Textbooks:**

1. Subbulakshmi. G and Shobha. A.U; Food Processing and Preservation, New Age International (P) Limited Publishers, 2014.
2. Srilakshmi. B, Food Science, 6<sup>th</sup> Edition, New Age International (P) Limited Publishers, 2015.

**Reference Books:**

1. Mann. I, Processing and Utilization of Animal By-products, 3<sup>rd</sup> Edition, Food and Agriculture Organization of the United Nations, 1962

<b>Credit Distribution</b>		
<b>Theory</b>	<b>Practical</b>	<b>Experiential Learning</b>
<b>88</b>	-	<b>32</b>
		<b>Understanding different preservation techniques like curing, smoking, freezing, and canning.</b>

## Semester VII

<b>Course: Major</b>	<b>Level of Course:400</b>	<b>Scheme of Evaluation:(T)</b>
<b>Title of Paper: Public Health Nutrition</b>	<b>Subject Code:NDC152M701</b>	
<b>L-T-P-C:3-1-0-0</b>	<b>Total credits:4</b>	

### Course Objective:

To get the students well-prepared to apply their knowledge and skills in real-world settings, contributing to improved nutritional health and well-being.

### Course outcomes:

<b>On successful completion of the course the students will be able to:</b>		
<b>CO</b>	<b>Course Outcome</b>	<b>Blooms Taxonomy Level</b>
<b>CO 1</b>	<b>Remember</b> the types of feeding techniques used for patients	<b>BT 1</b>
<b>CO 2</b>	<b>Understand</b> various nutritional assessments tools.	<b>BT 2</b>
<b>CO 3</b>	<b>Apply</b> knowledge and skills in administering different assessment tools.	<b>BT 3</b>
<b>CO 4</b>	<b>Analyse</b> and Interpret Data	<b>BT 4</b>
<b>CO 5</b>	<b>Evaluate</b> the effectiveness of various tools to interpret malnutrition	<b>BT 5</b>

### Course Outline

<b>Modules</b>	<b>Topics (if applicable) &amp; Course Contents</b>	<b>Periods</b>
<b>I.</b>	Overview of Public Health Nutrition - Definition and scope of public health nutrition. Social, economic, and environmental factors affecting nutrition	<b>15</b>
<b>II.</b>	Public Health Nutrition Frameworks-Models and frameworks for understanding public health nutrition. The role of government and non-governmental organizations in nutrition policy	<b>15</b>
<b>III.</b>	Nutrition Interventions and Programs: Principles of designing effective nutrition interventions. Target populations and setting objectives	<b>15</b>
<b>IV.</b>	Current Issues and Future Directions in Public Health Nutrition Global Nutrition Challenges, Food Security and Sustainability	<b>15</b>

	<b>TOTAL</b>	<b>60</b>
	<b>Pedagogy: Lectures, Assignments, Seminars</b>	

**Textbooks:**

1. "Public Health Nutrition: From Principles to Practice" by Mark Lawrence and Tony Worsley
2. "Nutrition in Public Health: Principles and Practice for Community Health" by Arlene Spark and Judith A. H. M. van der Meer
3. "Food and Nutrition Security: A Global Perspective" by David J. Stang and Bonnie H. H. Stang

<b>Course: Major</b>	<b>Level of Course: 400</b>	<b>Scheme of Evaluation: (P)</b>
<b>Subject Name: Practical on Public Health Nutrition</b>		<b>Subject Code: NDC152M711</b>
<b>Credit Units: 0-0-8-4</b>		<b>Total credit: 4</b>

**Course Objective:**

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

**Course Outcome:**

<b>On successful completion of the course the students will be able to:</b>		
<b>CO</b>	<b>Course Outcome</b>	<b>Blooms Taxonomy Level</b>
<b>CO 1</b>	<b>Remember</b> the ethical principles in nutrition practice, including respect for diversity and cultural sensitivity in community c	<b>BT 1</b>
<b>CO 2</b>	<b>Understand</b> the special nutritional support techniques and feeding formulations to meet nutritional needs of public health nutrition	<b>BT 2</b>
<b>CO 3</b>	<b>Apply</b> knowledge of nutrition and dietetics principles to assess and address public health nutrition issues effectively	<b>BT 3</b>
<b>CO 4</b>	<b>Analyse</b> Demonstrate critical thinking and problem-solving skills in the design and evaluation of nutrition interventions and programs	<b>BT 4</b>
<b>CO</b>	<b>Evaluate</b> the current nutritional guidelines and practices.	<b>BT 5</b>

**Detailed syllabus:**

<b>Modules</b>	<b>Topics / Course content</b>	<b>Periods</b>
<b>I</b>	<b>Dietary Assessment Methods:</b> ABCD Methods, Conducting 24-hour dietary recalls and food frequency questionnaires. Analyzing dietary intake using software tools (e.g., NutriSurvey, Food Processor). Interpreting dietary data and identifying nutritional deficiencies	<b>10</b>
<b>II</b>	<b>Community Nutrition Interventions:</b> Designing a Community Nutrition Program. Implementation of Nutrition Education Sessions	<b>12</b>
<b>III</b>	<b>Nutritional Surveillance and Data Collection:</b> Conducting Nutritional Surveys	<b>12</b>
<b>IV</b>	<b>Case Studies in Public Health Nutrition</b>	<b>14</b>
<b>Total</b>		<b>48</b>

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

<b>Course: Minor</b>	<b>Level of Course:400</b>	<b>Scheme of Evaluation:(T)</b>
<b>Title of Paper: Food Business Management</b>	<b>Subject Code:NDC152N701</b>	
<b>L-T-P-C:4-0-0-4</b>	<b>Totalcredits:20</b>	

**Course Objective:**

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

**Course Outcome:**

<b>On successful completion of the course the students will be able to:</b>		
<b>CO</b>	<b>Course Outcome</b>	<b>Blooms Taxonomy Level</b>
<b>CO 1</b>	<b>Remember</b> the significance of food and beverage as it relates to the hospitality	<b>BT 1</b>
<b>CO 2</b>	<b>Understand</b> of work areas such as Receiving, storing, food preparation, and serving	<b>BT 2</b>
<b>CO 3</b>	<b>Apply</b> the basic knowledge about menu planning	<b>BT 3</b>
<b>CO 4</b>	<b>Analyse</b> the standard of recipes and standard portion sizes	<b>BT 4</b>
<b>CO</b>	<b>Evaluate</b> the personnel management and financial management.	<b>BT 5</b>

**Detailed syllabus:**

<b>Modules</b>	<b>Topics / Course content</b>	<b>Periods</b>
<b>I</b>	Overview of the Food Industry- Structure and dynamics of the food industry, Key players in the food supply chain  Food Business Models- Types of food businesses (restaurants, catering, food trucks, etc.), Business model canvas for food businesses  Regulatory Environment- Food safety regulations and standards, Licensing and permits for food businesses	09
<b>II</b>	Marketing in the Food Industry- Marketing Principles, Understanding consumer behavior in the food sector, Market segmentation and targeting  Branding and Promotion- Building a food brand, Digital marketing strategies for food businesses  Sales Strategies- Pricing strategies in the food industry, Sales techniques and customer relationship management	09
<b>III</b>	Operations Management in Food Businesses- Supply Chain Management, Sourcing and procurement of food products, Inventory management techniques  Quality Control and Assurance- Importance of quality in food service, Implementing quality control systems  Food Production and Service- Menu planning and design, Food preparation and service techniques	09

<b>IV</b>	<p>Financial Management and Strategic Planning- Financial Fundamentals, Understanding financial statements (income statement, balance sheet, cash flow), Budgeting and forecasting for food businesses</p> <p>Investment and Funding- Sources of funding for food businesses, Evaluating investment opportunities</p> <p>Strategic Management- Developing a strategic plan for a food business, Competitive analysis and market positioning</p>	09
<b>Total</b>		<b>36</b>

**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 International (P) Ltd.

<b>Course: Major</b>	<b>Level of Course:400</b>	<b>Scheme of Evaluation:(P)</b>
<b>Title of Paper: Major Project/Dissertation/Internship</b>		<b>Subject Code:NDC152M721</b>
<b>Totalcredits:12</b>		

**Semester VIII**

<b>Course: Major</b>	<b>Level of Course:400</b>	<b>Scheme of Evaluation:(P)</b>
<b>Title of Paper: Internship</b>		<b>Subject Code:NDC152M811</b>
<b>Totalcredits:20</b>		