



## **Dr. N.G.P. ARTS AND SCIENCE COLLEGE**

(An Autonomous Institution, Affiliated to Bharathiar University, Coimbatore)  
 Approved by Government of Tamil Nadu & Accredited by NAAC with A++ Grade (3<sup>rd</sup> Cycle-3.64 CGPA)  
 Dr. N.G.P.-Kalapatti Road, Coimbatore-641 048, Tamil Nadu, India  
 Website: www.drngpasc.ac.in | Email: info@drngpasc.ac.in | Phone: +91-422-2369100

### **REGULATIONS 2024-25 for Post Graduate Programme**

**(Outcome Based Education model with Choice Based Credit System)**

### **M.Sc. FOOD AND NUTRITION**

(For the students admitted during the academic year 2024-25 and onwards)

#### **Eligibility:**

A pass in any one of the following Degree Courses of B.Sc. Nutrition and Dietetics, Nutrition, Food Service Management and Dietetics, Food Science and Quality Control, B.VOC- Food Processing Technology, Food Science and Nutrition, Botany, Zoology, Biochemistry, Biotechnology, Chemistry, Microbiology, Home science or Family and Community Science or an Examination accepted as equivalent thereto by the Academic Council, subject to such conditions as may be prescribed thereto are permitted to appear and qualify for the M.Sc. Food and Nutrition Examination of this College after a course study of two academic years.

#### **Programme Educational Objectives:**

The Curriculum is designed to attain the following learning goals which students shall accomplish by the time of their graduation:

1. To provide advanced knowledge on food science and nutrition to enhance the quality of life through the improvement of human health and nutritional status
2. To enable the students to implement the basic food science in operation
3. To develop skills and techniques in food preparation with conservation of nutrients and palatability using cooking methods generally employed
4. To help the students to contribute proper utilization of foods and prevent wastes
5. To understand the prevalence of malnutrition in our Country and gain knowledge on effective methods to combat malnutrition.



**PROGRAMME OUTCOMES:**

On the successful completion of the program, the following are the expected outcomes.

<b>PO Number</b>	<b>PO Statement</b>
<b>P01</b>	To develop the knowledge of the students in the area of human nutrition, food science, food product development, food safety and quality management.
<b>P02</b>	Apply recently advanced novel foods in medical nutrition therapy and recommend the physical activity to manage the common diseases and metabolic disorder to achieve the fitness and wellbeing.
<b>P03</b>	Familiarize with the problems and plan, implement, monitor and evaluate interventional programs related to food and nutrition and security to the community.
<b>P04</b>	To build entrepreneurial values, attitudes, quality and desire in developing innovative food products by fulfilling quality parameters, used to meet the consumer needs nutritionally and commercially viable.
<b>P05</b>	To develop skills and techniques for the students to become professionals in service industries.



### Total Credit Distribution

Course	Credits	Total		Credits	Cumulative Total	
Core	4	14x 100	1400	56	92	
Core Practical	3	2 x 100	200	06		
	2	2 x 100	200	04		
EDC	4	1 x 100	100	04		
Core Project Work	8	1 x 200	200	08		
Internship	2	1 x 100	100	02		
Electives	3	3 x 100	300	09		
Elective Practical	3	1 x 100	100	03		
			<b>2700</b>	<b>92</b>		<b>92</b>





**PG  
CURRICULUM**

**M.Sc. Food and Nutrition  
AY 24-25**

Course Code	Course Category	Course Name	L	T	P	Duration		Exam (h)	Max Marks			Credits
						Week	Total		CIA	ESE	Total	
<b>First Semester</b>												
24FNP1CA	Core - I	Advanced Food Science	4	1	1	6	72	3	25	75	100	4
24FNP1CB	Core - II	Nutrition Through Life Cycle	4	1	1	6	72	3	25	75	100	4
24FNP1CC	Core - III	Nutritional Biochemistry	4	-	-	4	48	3	25	75	100	4
24FNP1CD	Core - IV	Food Chemistry	4	1	1	6	72	3	25	75	100	4
24FNP1CP	Core Practical - I	Food Science and Food Chemistry	-	-	4	4	48	3	40	60	100	2
24FNP1DA	DSE - I	Functional Foods and Nutraceuticals	4	-	-	4	48	3	25	75	100	3
24FNP1DB		Food Product Development										
24FNP1DC		Harvest Technology of Agricultural Produce										
<b>Total</b>			<b>20</b>	<b>03</b>	<b>07</b>	<b>30</b>	<b>360</b>				<b>600</b>	<b>21</b>



Course Code	Course Category	Course Name	L	T	P	Duration		Exam h	Max Marks			Credits
						Week	Total		CIA	ESE	Total	
<b>Second Semester</b>												
24FNP2CA	Core - V	Food Processing	4	1	-	5	60	3	25	75	100	4
24FNP2CB	Core - VI	Applied Physiology	4	-	-	4	48	3	25	75	100	4
24FNP2CC	Core - VII	Therapeutic Nutrition - I	4	-	-	4	48	3	25	75	100	4
24FNP2CD	Core - VIII	Macronutrients	4	-	-	4	48	3	25	75	100	4
24FNP2CP	Core Practical - II	Food Analysis	-	-	6	6	72	3	40	60	100	3
24FNP2CE	EDC	Computer Application in Nutrition	4	-	-	4	48	3	25	75	100	4
24FNP2DA	DSE - II	Food Biotechnology	3	-	-	3	36	3	25	75	100	3
24FNP2DB		Food Waste and By-Product Utilization										
24FNP2DC		Food Toxicology										
<b>Total</b>			<b>23</b>	<b>1</b>	<b>6</b>	<b>30</b>	<b>360</b>				<b>700</b>	<b>26</b>



Course Code	Course Category	Course Name	L	T	P	Duration		Exam (h)	Max Marks			Credits
						Week	Total		CIA	ESE	Total	
<b>Third Semester</b>												
24FNP3CA	Core – IX	Micronutrients	4	-	-	4	48	3	25	75	100	4
24FNP3CB	Core – X	Therapeutic Nutrition - II	4	-	-	4	48	3	25	75	100	4
24FNP3CC	Core – XI	Research Methodology and Statistics	4	1	-	5	60	3	25	75	100	4
24FNP3CD	Core – XII	Food Additives and Contaminants	4	-	-	4	48	3	25	75	100	4
24FNP3CP	Core Practical - III	Food Analytical Techniques	-	-	6	6	72	3	40	60	100	3
24FNP3CQ	Core Practical - IV	Therapeutic Nutrition-	-	-	4	4	48	3	40	60	100	2
24FNP3CT	IT	Internship	-	-	-			3	40	60	100	2
24FNP3DA	DSE - III	Instrumentation in Food Industry	3	-	-	3	36	3	25	75	100	3
24FNP3DB		Food Packaging Techniques										
24FNP3DC		Food Microbiology										
<b>Total</b>			<b>19</b>	<b>01</b>	<b>10</b>	<b>30</b>	<b>360</b>				<b>800</b>	<b>26</b>






Course Code	Course Category	Course Name	L	T	P	Duration		Exam (h)	Max Marks			Credits
						Week	Total		CIA	ESE	Total	
<b>Fourth Semester</b>												
24FNP4CA	Core - XIII	Public Health Nutrition	4	-	-	4	48	3	25	75	100	4
24FNP4CB	Core - XIV	Food Safety and Quality Management	4	-	-	4	48	3	25	75	100	4
24FNP4CC	Core - XV	Project Work and Viva Voce	-	-	16	16	192	3	80	120	200	8
24FNP4DP	DSE - IV	Food Quality Control	-	-	6	6	72	3	40	60	100	3
24FNP4DQ		Nutrition in Health										
24FNP4DR		Food Fermentation Techniques										
<b>Total</b>			<b>08</b>	<b>-</b>	<b>22</b>	<b>30</b>	<b>360</b>				<b>500</b>	<b>19</b>
<b>*Grand Total</b>											<b>2600</b>	<b>92</b>

D. Mh.

BoS Chairman/HoD  
Department of Food Science & Nutrition  
Dr. N. G. P. Arts and Science College  
Coimbatore - 641 042

 <b>Dr.N.G.P. Arts and Science College</b>		
<b>APPROVED</b>		
BoS- 17 <sup>th</sup> 05-04-24	AC- 17 <sup>th</sup> 17-04-24	GB-



## DISCIPLINE SPECIFIC ELECTIVE

### Semester I (Elective I)

(Student shall select any one of the following courses as Elective in first semester)

#### List of Elective Courses

S. No.	Course Code	Name of the Course
1.	24FNP1DA	Functional Foods and Nutraceuticals
2.	24FNP1DB	Food Product Development
3.	24FNP1DC	Harvest Technology of Agricultural produce

### Semester II (Elective II)

(Student shall select any one of the following courses as Elective in second semester)

#### List of Elective Courses

S. No.	Course Code	Name of the Course
1.	24FNP2DA	Food Biotechnology
2.	24FNP2DB	Waste and By-Product Utilization
3.	24FNP2DC	Food Toxicology

### Semester III (Elective III)

(Student shall select any one of the following course as Elective in Third semester)

#### List of Elective Courses

S. No.	Course Code	Name of the Course
1.	24FNP3DA	Instrumentation in Food Industry
2.	24FNP3DB	Food Packaging Techniques
3.	24FNP3DC	Food Microbiology





**Semester IV (Elective IV)**

(Student shall select any one of the following courses as Elective in fourth semester)

**List of Elective Courses**

S. No.	Course Code	Name of the Course
1.	24FNP4DP	Food Quality Control
2.	24FNP4DQ	Nutrition in Health
3.	24FNP4DR	Food Fermentation Techniques

**Self-study paper offered by the Department of Food Science and Nutrition**

S. No.	Semester	Course Code	Course Name
1	III	24FNPSSA	Composite Home science
2	III	24FNPSSB	Diet Counseling



## Semester – I

## CORE - I: ADVANCED FOOD SCIENCE

Semester	Course Code	Course Name	Category	L	T	P	Credits
I	24FNP1CA	ADVANCED FOOD SCIENCE	CORE	48	12	12	4

<b>Preamble</b>	<p>This course has been designed for students to learn and understand</p> <ul style="list-style-type: none"> <li>the structure, classification and nutrient composition of foods</li> <li>identify what foods are good sources for what nutrients</li> <li>appropriate sensory evaluation tests to answer specific questions regarding food attributes or consumer preferences</li> </ul>
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<b>Prerequisite</b>	Knowledge on advanced food science concepts
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Course Outcomes (COs)		
CO Number	Course Outcomes (COs) Statement	Bloom's Taxonomy Knowledge Level
CO1	Analyze the structure of foods and compare the nutrient composition of foods	K2
CO2	Classify foods based on food processing and explain the methods of processing different foods	K3
CO3	Interpret the factors which affects the nutritive value of foods, classify the methods of cooking	K3
CO4	Examine the postmortem changes in meat, criticize the food quality, analyze the medicinal value of foods	K3
CO5	Choose foods based on quality, decide storage condition, subjective and objective evaluation of foods	K3

Mapping with Program Outcomes:					
COs / POs	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	✓		
CO2		✓	✓		
CO3	✓		✓	✓	✓
CO4		✓		✓	
CO5	✓		✓		✓



## Syllabus

Unit	Content	Hours	E-Contents / Resources
I	<p>Cereals</p> <p>Rice - Structure, Composition and nutritive value, Cereal cookery</p> <p>Wheat - Structure, composition and nutritive value. Wheat flour — types, functionality of components, baking qualities, manufacture of bread, pastries and cakes</p> <p>Millets- Jowar, Bajra, Maize and Ragi, Composition and nutritive value and Products</p>	14	Text Book
II	<p>Pulses, Fats &amp; Oils</p> <p>Pulses - Composition and nutritive value, methods of processing – dry and wet processing, vegetable protein mixes, Anti nutritional factors and eliminations</p> <p>Nuts and Oilseeds- Composition and nutritive value, nutritious food mixes from oil seeds, toxins</p> <p>Fats and Oil - Nutritional importance of oil and fats, Functions of oil and fats in foods, Sources, nutritional composition, rancidity — types and prevention, role of fat / oil in food preparations</p>	15	Text book
III	<p>Fruits &amp; Vegetables</p> <p>Classification, Composition and nutritive value, selection, storage, pigments, browning reactions (Enzymatic and Non-Enzymatic), pectic substances, ripening of fruits, changes on cooking</p> <p>Beverages – Classification. Milk and fruit-based beverages, carbonated nonalcoholic beverages</p> <p>Spices and condiments – Type, uses and adulteration, role in cookery and medicinal uses</p> <p>Evaluation of foods - Subjective and objective evaluation of foods. Study of proximate constituents</p>	14	Text Book
IV	<p>Milk and milk products &amp; egg</p> <p>Composition, physical and chemical properties - effects of heat, acid and enzymes, processing of milk – pasteurization, homogenization, types of milk. Milk products – Butter, curd, yogurt, butter milk, cheese, milk powder, khoa, ice cream</p> <p>Egg - Structure, composition, grading and selection, effects of heat on egg protein, egg foam (factors affecting foam formation) and role in cookery</p>	14	Reference book





V	Meat, poultry & fish	15	Text Book
	Meat - Structure, composition, postmortem changes, Rigor mortis, Aging and Tenderization of meat, color of meat, changes of meat in cookery and methods of cooking, meat analogues Poultry - Classification, composition, market forms, selection factors and methods of cooking Fish - Classification, composition, kinds of fish, characteristics of fresh fish, fish products and methods of cooking		
<b>Total</b>		72	

<b>Text Books</b>	1.	Srilakshmi, B 2015, "Food Science," 8th Edition, New Age International Private Ltd., New Delhi.
	2.	Manay & Shadaksharaswamy, S.N & M, 2008, "Food facts and Principles", New Age International Private Ltd. New Delhi.
<b>Reference Books</b>	1.	Potter. N. N and Hotchkiss, 1996, "Food Science", CBS Publication, New Delhi.
	2.	Sunetra Roday, I. N. 2015, — "Food Science and Nutrition" Oxford Publishers New Delhi

<b>Journal and Magazines</b>	<a href="https://link.springer.com/journal/13197">https://link.springer.com/journal/13197</a>
<b>E-Resources and Website</b>	<a href="https://ifst.onlinelibrary.wiley.com/journal/13652621">https://ifst.onlinelibrary.wiley.com/journal/13652621</a>

<b>Learning Method</b>	Chalk and Talk/Assignment/ Seminar/ Interactive session
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<b>Focus of the Course</b>	Skill Development / Employability / Innovation and Entrepreneurship
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## Semester – I

## CORE II: NUTRITION THROUGH LIFE CYCLE

Semester	Course Code	Course Name	Category	L	T	P	Credits
I	24FNP1CB	NUTRITION THROUGH LIFE CYCLE	CORE	48	12	12	4

<b>Preamble</b>	This course has been designed for students to learn and understand <ul style="list-style-type: none"> <li>• The role of adequate nutrition in stages of life cycle</li> <li>• The role of nutrition in the growth &amp; development of human body</li> <li>• The importance of proper dietary pattern and its health effects</li> </ul>	
<b>Prerequisite</b>	Knowledge about nutritional requirements for various stages of life	
<b>Course Outcomes (COs)</b>		
CO Number	Course Outcomes (COs) Statement	Bloom's Taxonomy Knowledge Level
CO1	Plan diet for the stages of the life span. Learning nutritional requirements of preconception & pregnancy.	K2
CO2	Analyze specific dietary practices during lactation complementary and weaning foods for infants.	K3
CO3	Illustrate the nutrition for toddlers, school children - physiological & cognitive development.	K3
CO4	Evaluate physical growth, eating disorders, physiological changes among adolescence, adulthood and old age.	K4
CO5	Examine the nutritional requirements for sports, exercise and special condition.	K4

## Mapping with Program Outcomes:

COs / POs	PO1	PO2	PO3	PO4	PO5
CO1	✓				✓
CO2		✓	✓		
CO3	✓		✓	✓	✓
CO4		✓		✓	
CO5	✓		✓		✓





## Syllabus

Unit	Content	Hours	E-Contents / Resources
I	<p>Nutrition in Preconception and Pregnancy</p> <p>Nutrition in Preconception-Introduction, premenstrual syndrome, obesity and fertility, eating disorder and fertility, polycystic ovary syndrome, nutrient intake for pre-conceptual women, factors contributing infertility in female.</p> <p>Nutrition in pregnancy - Stages of gestation, maternal physiological adjustments, weight gain during pregnancy and nutritional requirements for pregnancy, miscarriage, preterm delivery, multi fetal pregnancies, eating disorders and complications of pregnancy.</p>	13	Text Book
II	<p>Nutrition in Lactation and Infancy</p> <p>Nutrition in Lactation - Physiological adjustments during lactation, Physiology of milk Production - hormonal controls and reflex action, lactation in relation to growth and health of infants, Breast feeding and problems of breast feeding, nutritional composition of colostrum and mature milk, special foods during lactation, nutritional requirements during lactation. Expressing and storing breast milk, Breast feeding promotion network of India.</p> <p>Nutrition in Infancy - Rate of growth, weight as the indicator, premature infant, feeding premature infants, low birth weight, breast vs. bottle feeding, nutritional allowances, complementary feeding, and weaning foods.</p>	16	Reference Book
III	<p>Nutrition for Toddlers and School age</p> <p>Nutrition in Toddlers-Physiological and Cognitive development, feeding skill and behavior, common nutrition problems. Nutrition in Preschool Children - Growth and development of preschool children, food habits, nutritional requirements, supplementary foods.</p> <p>Nutrition in School Age – Early and middle childhood, physiological development, nutritional requirements and feeding, packed lunches, post school snacks, physical activity and nutrition.</p>	12	Text Book
IV	<p>Nutrition During Adolescence, Adulthood and Old age</p> <p>Nutrition During Adolescence - Physical growth, physiological and psychological changes associated with puberty (menarche and menstruation in girls), nutritional needs, eating disorders - anorexia nervosa, bulimia nervosa, physiological and nutritional problems in</p>	16	Text Book





	<p>adolescent pregnancy and its requirements and complications, physical activity and nutrition.</p> <p>Nutrition during Adulthood — Physiological changes of adulthood Nutrition and work efficiency for maintenance of health, RDA</p> <p>Nutrition for Old Age – senescence and sarcopenia - theories of ageing, physiological changes, Socio economic and psychological factors — geriatric foods and nutritional requirements, factors affecting food intake, institutionalized changes in old age.</p>		
V	<p>Nutrition for Sports and Special Condition</p> <p>Sports and Exercise Fitness - Physical fitness assessment — cardio respiratory fitness, assessment of body composition. Role of carbohydrate, fat and protein as a fuel for exercise, fluid and electrolyte balance during prolonged exercise, nutritional requirements in sports, dietary intake before, during and after exercise. Concept of aerobic and anaerobic exercises, Nutrition for higher altitudes, Nutrition for expeditions and space voyage, Nutrition for armed forces, Nutrition for special children- ADHD and ASD.</p>	15	Text Book
	<b>Total</b>	<b>72</b>	

<b>Text Books</b>	1.	Srilakshmi.B, 2010 "Dietetics", 7th edition., New Age International Pvt. Ltd, New Delhi
	2.	Ravinder Chandha, Pulkit Mathur, "Nutrition-A lifecycle approach" Orient Blackswan
<b>Reference Books</b>	1.	Brown, J.E, 2011, "Nutrition Through The Lifecycle", 4th edition Wadsworth Cengage Learning, USA
	2.	Mahan and Escott ,K & S, 2004, "Food Nutrition and Diet Therapy", 11th Edn., W.S. Saunder's Company, USA

<b>Journal and Magazines</b>	<a href="https://www.cambridge.org/core/journals/journal-of-nutritional-science">https://www.cambridge.org/core/journals/journal-of-nutritional-science</a>
<b>E-Resources and Website</b>	<a href="https://www.nutritionociety.org/journal-nutritional-science">https://www.nutritionociety.org/journal-nutritional-science</a>

<b>Learning Method</b>	Chalk and Talk / Assignment / Interactive session
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<b>Focus of the Course</b>	Skill Development/ Employability
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## Semester – I

## CORE - III: NUTRITIONAL BIOCHEMISTRY

Semester	Course Code	Course Name	Category	L	T	P	Credits
I	24FNP1CC	NUTRITIONAL BIOCHEMISTRY	CORE	48	-	-	4

<b>Preamble</b>	This course has been designed for students to learn and understand <ul style="list-style-type: none"> <li>The application of biochemistry in the field of Food and Nutrition</li> <li>The on-assay techniques and instrumentation</li> <li>The role of nutrients in the body</li> </ul>
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<b>Prerequisite</b>	Knowledge on metabolic process in human body
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<b>Course Outcomes (COs)</b>		
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CO Number	Course Outcomes (COs) Statement	Bloom's Taxonomy Knowledge Level
CO1	Infer on carbohydrate metabolism	K2
CO2	Illustrate the cholesterol metabolism and the inborn errors of fat metabolism	K3
CO3	Explain the biosynthesis and importance of protein metabolism in biochemical analysis	K3
CO4	Interpret the significance of nucleic acids in the field of biochemistry	K3
CO5	Editorialize the principle and techniques involved in the field of biochemistry	K3

<b>Mapping with Program Outcomes:</b>					
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COs / POs	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	✓		
CO2		✓	✓		
CO3	✓		✓	✓	✓
CO4		✓		✓	
CO5	✓		✓		✓



## Syllabus

Unit	Content	Hours	E-Contents / Resources
I	Carbohydrates Carbohydrates – classification, functions. Glycolysis, TCA Cycle, HMP Shunt and Energy Production, Glycogenesis, Gluconeogenesis. Renal threshold for Glucose. Inborn Error of Carbohydrate Metabolism – Lactose Intolerance, fructosuria, Galactosemia.	10	Text Book
II	Fatty Acids Fatty Acids - Classification, Functions and Oxidation of Saturated and Unsaturated Fatty Acids, Biosynthesis of Cholesterol, Structure and Functions of Lecithin, Cephalin. Inborn errors of Fat Metabolism – Niemann-Pick Disease, Gouchers Disease	10	Text Book
III	Protein Protein- Classification, Function & Metabolism of Protein, Denaturation, Transamination, Deamination, Decarboxylation, Urea Formation and Protein Synthesis. Amino acids – Classification, Function & Metabolism of Amino acids, phenylalanine, leucine, methionine and tryptophane. Inborn errors of Amino acids – maple syrup urine disease, phenyl ketonuria.	08	Reference Book
IV	Nucleic acids Nucleic acids – structure, function and properties of DNA and RNA. Biosynthesis and breakdown of purine and pyrimidine nucleotides. Assay Techniques: Bioassay techniques, molecular cloning, microbiological assay of vitamins. ELISA.	10	Text Book
V	Techniques in nutritional biochemistry in nutritional biochemistry- Separation of sugars and amino acids by chromatography. Electrophoresis separation of proteins. Colorimetry and spectrophotometer - principle and procedures. pH meter – working and application. Principle and procedure of operation of GC, HPLC and HPTLC. Elemental analysis by atomic absorption spectroscopy and flame photometry	10	Text Book
	<b>Total</b>	<b>48</b>	



<b>Text Books</b>	1.	Lehninger A.L, 2000, "Biochemistry". 7Edition, Worth Publishers Inc., New York.
	2.	Deb A.C, 2004, "Fundamentals of Biochemistry", 8 Edition New Central Book Agency Pvt Ltd., Kolkata –India.
<b>Reference Books</b>	1.	Shanmugam. A, 2004, "Fundamentals of Biochemistry for Medical Students", 7th Edition Karthik Printers, India.
	2.	Sathyanarayana. U and Chakrapani. U, 2004, "Biochemistry". 3rd Edition Books and Allied Publication, Kolkata, India.
	3.	Tom Brody, 2007, "Nutritional Biochemistry", 2nd Edition Academic press, U.K.
	4.	Sharma. D and Devanshi Sharma. C ,2015, "Nutritional Biochemistry", 2nd Edition CBS publishing pvt. Ltd., New Delhi.

<b>Journal and Magazines</b>	<a href="https://www.sciencedirect.com/journal/the-journal-of-nutritional-biochemistry">https://www.sciencedirect.com/journal/the-journal-of-nutritional-biochemistry</a>
<b>E-Resources and Website</b>	<a href="https://www.sabapub.com/index.php/jcnb">https://www.sabapub.com/index.php/jcnb</a>

<b>Learning Method</b>	Chalk and Talk /Assignment/ Seminar/ Interactive session
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<b>Focus of the Course</b>	Skill Development/ Employability
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## Semester – I

## CORE - IV: FOOD CHEMISTRY

Semester	Course Code	Course Name	Category	L	T	P	Credits
I	24FNP1CD	FOOD CHEMISTRY	CORE	48	12	12	4

<b>Preamble</b>	This course has been designed for students to learn and understand <ul style="list-style-type: none"> <li>• The gain insight into the chemistry of foods</li> <li>• The chemistry underlying the properties of various food components</li> <li>• Biochemical and enzymatic reactions that influence food quality with emphasis on food industry applications.</li> </ul>
<b>Prerequisite</b>	

## Course Outcomes (COs)

CO Number	Course Outcomes (COs) Statement	Bloom's Taxonomy Knowledge Level
CO1	Elaborate the structure and properties of water and ice, Elucidate the structure, permanence and Emulsions	K2
CO2	Explicate the chemistry of mono and oligosaccharides, Use of Polysaccharides in gelatinization, retrogradation.	K3
CO3	Illustrate the structure, physicochemical properties, functional properties of amino acids.	K3
CO4	Explicate the classification, sources, composition, and properties, role of lipids in food flavor.	K3
CO5	Illuminate the chemistry of Individual aroma compounds-vegetable, fruit and spice and condiment.	K3

## Mapping with Program Outcomes:

COs / POs	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	✓		
CO2		✓	✓		
CO3	✓		✓	✓	✓
CO4		✓		✓	
CO5	✓		✓		✓



## Syllabus

Unit	Content	Hours	E-Contents / Resources
I	Physico-chemical properties of water and foods Structure and properties of water and ice, types of water, concept of water activity and Food spoilage, Sorption phenomena. Gels: Structure, formation, strength, types and permanence Emulsions: formation, stability, surfactants and emulsifiers, Foams: Structure, formation and stabilization.	14	Text Book
II	Chemistry of Starch and Sugars Applications of polysaccharides in foods: non-starch polysaccharides: cellulose, hemicelluloses, pectins, gums (gum arabic, guar gum, xanthan gum), agar, alginates, carrageenan Starch: structure, properties of amylose and amylopectin, effect of processing gelatinization, Characteristics of some food starches. Effects of ingredients and conditions on gelatinization- retrogradation, polysaccharide hydrolysis.	14	Text Book
III	Chemistry of Proteins Amino acids, peptides and proteins - structure, physicochemical properties, functional properties, chemical and enzymatic modifications - denaturation, nonenzymatic browning, and other chemical changes, processing induced physical, chemical and nutritional changes, texturized proteins, protein isolates, concentrates, protein hydrolysate	15	Reference Book
IV	Chemistry of Fats and Oils Classification, distribution, composition, physical and chemical properties. Effect of processing on chemical structure and physical properties; functional properties of fat and uses in food preparations, inter-esterification of fats. Lipids exposed to frying conditions and hydrogenated fat. Lipid-protein complexes, emulsions. Fat deterioration and antioxidants and fat substitutes.	14	You Tube Videos
V	Chemistry of Pectic Substances, Plant Pigments, Spices and Condiments Pectins, phenolic components, enzymatic browning in fruits and vegetables, volatile compounds from vegetables during cooking, chemical properties of plant pigments –	15	Text Book





	water and fat soluble pigments, properties and active principles in spices and condiments.		
	<b>Total</b>	<b>72</b>	

<b>Text Books</b>	1.	Shakuntala Manay, Shadaksharaswamy,M, 2000, "Foods, Facts and Principles', 2th Edition, New Age International Pvt Ltd Publishers, Delhi.
	2.	Chandrasekhar, U., 2002, "Food Science and applications in Indian Cookery ",10 Edition, Phoenix Publishing House, New Delhi.
<b>Reference Books</b>	1.	Swaminathan, M. 2005, "Food Science, Chemistry and Experimental Foods", Bappco Publishers, Bangalore.
	2.	Meyer,L.H, 2004,"Food Chemistry and Distributors", 4th Edition, CBS Publishers.
	3.	Paul, and Palmer, P.C, 2000, "Food Theory and Applications", John Wiley and Sons, New York.
	4.	Chopra and Panesar, H.K, 2010, "Food Chemistry", New Narosa Publishing House, Delhi.

<b>Journal and Magazines</b>	<a href="http://foodb.ca/">http://foodb.ca/</a>
<b>E-Resources and Website</b>	<a href="https://pubs.acs.org/journal/jafcau">https://pubs.acs.org/journal/jafcau</a>

<b>Learning Method</b>	Chalk and Talk/Assignment / Interactive session
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<b>Focus of the Course</b>	Skill Development/ Employability
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<b>24FNP1CP</b>	<b>FOOD SCIENCE AND FOOD CHEMISTRY</b>	<b>SEMESTER I</b>
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**Total Credits:** 2  
**Total Instructions Hours:** 48 h

<b>S.No.</b>	<b>Contents</b>
1	Dextrinization, Gelatinization of Starch, Retrogradation and Syneresis, Malting of cereals.
2	Microscopic examination of uncooked and gelatinized starch
3	Gluten Formation
4	Effect of Soaking, germination and fermentation of Pulses
5	Enzymatic Browning and Methods of Prevention
6	Effect of acids, alkali and heat on water soluble and fat-soluble pigments
7	Scum formation, boiling over and scorching of milk Coagulation and precipitation of milk proteins
8	Testing freshness of egg- Coagulation of egg white and egg yolk, Boiled Egg, Poached Egg, Omelets, Custards, Cake and Mayonnaise
9	Changes observed in cooking meat, fish and poultry, testing the tenderness of meat
10	Smoking Temperature of different fats, Factors affecting absorption of fats
11	Stages of Sugar Cookery, Preparation of Fondant, Fudge, Caramel and Toffee
12	Sensory Evaluation of Food

**Note:** Out of 12 – 10 Mandatory

<b>Reference Books</b>	1.	Mohini Sethi, Eram. S. Rao, 2021, "Food Science - Experiments and Applications," CBS Publishers, India.
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## Semester – I

## DSE - I: FUNCTIONAL FOODS AND NUTRACEUTICALS

Semester	Course Code	Course Name	Category	L	T	P	Credits
I	24FNP1DA	FUNCTIONAL FOODS AND NUTRACEUTICALS	DSE	48	-	-	3

<b>Preamble</b>	This course has been designed for students to learn and understand <ul style="list-style-type: none"> <li>• Medicinal benefits of natural, nutraceuticals belong to different phytochemical categories.</li> <li>• The functional foods and their role in the human health and well-being.</li> <li>• The role of diet and dietary components in chronic diseases</li> </ul>
<b>Prerequisite</b>	It deals with the functional foods and nutraceuticals (FFN) products and their bio availability and health benefits.

## Course Outcomes (COs)

CO Number	Course Outcomes (COs) Statement	Bloom's Taxonomy Knowledge Level
CO1	Analyze and examine the basics and importance of nutraceuticals. and functional foods	K5
CO2	Determine the various properties and structure of nutraceuticals	K5
CO3	Inspect nutraceuticals of plant, animal and microbial origin Appreciate the Importance of nutraceuticals in field of medicine.	K5
CO4	Distinguish between functional foods and nutraceuticals. Explain role of fibers and syn-biotic with respect to health	K5
CO5	Design the role of nutraceuticals as food remedies in the field of functional food industry.	K5

## Mapping with Program Outcomes:

COs / POs	PO1	PO2	PO3	PO4	PO5
CO1		✓		✓	✓
CO2	✓	✓		✓	✓
CO3	✓	✓		✓	✓
CO4	✓	✓		✓	✓
CO5	✓	✓		✓	✓





## Syllabus

Unit	Content	Hours	E-Contents / Resources
I	Introduction to Nutraceuticals and Functional Foods Nutraceutical- Definition, Classification - Dietary supplements, Functional foods, Historical perspective, scope and future prospects, applied aspects of the Nutraceutical Science, Sources of Nutraceuticals	9	Textbook
II	Properties, structure and functions of various Nutraceuticals Glycosides, Isoprenoid derivatives, Glucosamine, Octacosanol, Flavonoids, Carotenoids, Polyunsaturated fatty acids, Lecithin, Choline and Spingolipids, Phospholipids, Lycopene, Carnitine, Resveratrol, Curcumin, Ellagic acid, Astaxanthin, Zeaxanthin, Chlorogenic acid, Gingerol and Ornithine alpha ketoglutarate, Phytoestrogens, Organosulphur compounds as neutraceuticals.	9	Textbook
III	Nutraceuticals of plant, animal and microbial origin Plant secondary metabolites, classification and sub-classification - Alkaloids, phenols, Terpenoids, extraction and purification, applications, Concept of Animal metabolites - Sources and extraction of nutraceuticals of animal origin, Examples: chitin, chitosan, glucosamine, chondroitin sulphate, Essential Fatty acids - EPA, DHA, CLA and other polysaccharides of animal origin, Nutraceuticals of microbial origin, uses and applications in preventive medicine and treatment.	10	Textbook
IV	Functional Foods and its applications Definition, Relation of functional foods and Nutraceutical (FFN) to foods and drugs, applications of herbs to functional foods, Concept of free radicals and antioxidants; Nutritive and Non-nutritive food components with potential health effects, Soy proteins and soy isoflavones in human health; Role of nuts in prevention of cardiovascular disease. Functional foods from wheat and rice and their health effects.  Role of Dietary fibers in disease prevention; Vegetables, Cereals, milk and dairy products as Functional foods, Health effects of prebiotics, probiotic and synbiotic foods and effects.	11	Textbook



V	Food as remedies	9	Textbook
	Nutraceuticals in treatment for cognitive decline, Arthritis, Neurological disorders, circulatory problems, hypoglycemia, Nephrological disorders, Liver disorders, Osteoporosis and Ulcers etc, Nutraceutical rich supplements e.g. Bee pollen, Caffeine, Green tea, Lecithin, Mushroom extract, Chlorophyll, Kelp and Spirulina. Nutrigenomics - concept of personalized and precision nutrition. Use of Nanotechnology in functional food industry.		
<b>Total</b>		<b>48</b>	

<b>Text Books</b>	1.	Wildman,R.E, 2000, "Handbook of Nutraceuticals and Functional Foods" CRC Press, Boca Raton.
	2.	Perkins Muredzi, 2013, "Food is Medicine - An Introduction to Nutraceuticals", Lambert Academic Publishing, Europe.
<b>Reference Books</b>	1.	Jeffery, H. W. 2002, "Methods of Analysis for Functional Foods and Nutraceuticals", 1st Edition, CRC Press, New York.
	2.	Mahan.K and Escott.S., 2004, "Food Nutrition and Diet Therapy" 11th Edition, W.S. Saunder's Company, USA .
	3.	Murray Robert, 2018, "Harper's Biochemistry", 31st Edition, Prentice Hall International UK Ltd , UK.
	4.	Degbasis Bagchi, 2010, "Biotechnology in functional foods and nutraceuticals", 10 Edition, CRC press Taylor, Francis group, London.

<b>Journal and Magazines</b>	<a href="http://www.ijird.com">www.ijird.com</a> .
<b>E-Resources and Website</b>	<a href="https://www.sciencedirect.com/journal/journal-of-functional-foods">https://www.sciencedirect.com/journal/journal-of-functional-foods</a>

<b>Learning Method</b>	Chalk and Talk / Seminar/ Interactive session/ Assignment
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<b>Focus of the Course</b>	Skill Development/ Employability/ Entrepreneurial Development
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## Semester – I

## DSE - I : FOOD PRODUCT DEVELOPMENT

Semester	Course Code	Course Name	Category	L	T	P	Credits
I	24FNP1DB	FOOD PRODUCT DEVELOPMENT	DSE	48	-	-	3

<b>Preamble</b>	This course has been designed for students to learn and understand <ul style="list-style-type: none"> <li>The various aspects of food product develop food science and technology, packaging, nutrition values and marketing</li> <li>Modern aspects of nutritional science and novel food usage</li> <li>Recognize the potential for entrepreneurship through marketing</li> </ul>	
<b>Prerequisite</b>	To learn the different stages of product development	
<b>Course Outcomes (COs)</b>		
CO Number	Course Outcomes (COs) Statement	Bloom's Taxonomy Knowledge Level
CO1	Choose raw materials, standardizations for products. use of the technology and marketing on health concerns.	K3
CO2	Categorize the products for the development to the community.	K4
CO3	Examine sensory and objective evaluation test, score card designing and Instruments used for texture evaluation.	K4
CO4	Select the types of food packing materials	K5
CO5	Build the marketing structure and integration Improve the marketing efficiency	K6

**Mapping with Program Outcomes:**

COs / POs	PO1	PO2	PO3	PO4	PO5
CO1		✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓





### Syllabus

Unit	Content	Hours	E-Contents / Resources
I	New product development Definition and classification, characterization and factors shaping new product development. Food product development and technologies, Marketplace influence. Measures of Food Product Success-Production, Market, Customer, New product development – patent, patent laws, international code for Intellectual property rights (IPR)	11	Textbook
II	Phases of product development Food product development- stages in product development, Level of Innovation-New product categories. FSSAI Regulations	8	Textbook
III	Sensory Evaluation Establishing sensory panels – Designing testing facilities – Analytical Test – Conduct a sensory Evaluation Test – Designing score card, objective evaluation, Instruments used for texture evaluation.	9	Textbook
IV	Formulation of new product development Formulation of product for infants, preschool, elderly, sports person - Selection of raw materials, portion size, standardization methods, calculation of nutritive values, cost- Suggested Retail Price (SRP), shelf life.	9	Textbook
V	Packaging and Marketing Packaging – Types of packing materials, Labelling. Concept of market and marketing – Approaches to study marketing functions, market structure, market efficiency and market integration. Role of government in promoting agricultural marketing. GST for newly developed product.	11	Textbook
<b>Total</b>		<b>48</b>	

Text Books		
	1.	Sharma A.2018, "Food Product Development" CBS Publishers and Distributors Private Ltd., New Delhi.
	2.	Fuller. G. W 2008, "New Food Product Development from Concept to Marketplace", New Age International Private Ltd, New Delhi.



<b>Reference Books</b>	1.	Earle, R., and Anderson, A, 2001, "Food product development: Maximizing success", CRC press,England.
	2.	Sivarama Prasad ,A., 1985, "Agricultural marketing in India", Mittal Publication, New Delhi.
	3.	Aaron, Brody, Joha Lord,L and B., 2005, "New Food Product for a changing Market place", 2nd Edition.
	4.	Baker, R.C 1988, " Fundamentals of New Food Product Development", 8th Edition, New Age International Private Ltd. New Delhi.

<b>Journal and Magazines</b>	<a href="https://www.researchgate.net/publication/259054153_New_Food_Product_Development">https://www.researchgate.net/publication/259054153_New_Food_Product_Development</a>
<b>E-Resources and Website</b>	<a href="https://www.cbspd.co.in/food-product-development-pb-2018">https://www.cbspd.co.in/food-product-development-pb-2018</a>

<b>Learning Method</b>	Chalk and Talk/Assignment/ Seminar
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<b>Focus of the Course</b>	Skill Development/ Employability/ Entrepreneurial Development
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## Semester – I

## DSE - I: HARVEST TECHNOLOGY OF AGRICULTURAL PRODUCE

Semester	Course Code	Course Name	Category	L	T	P	Credits
I	24FNP1DC	HARVEST TECHNOLOGY OF AGRICULTURAL PRODUCE	DSE	48	-	-	3

<b>Preamble</b>	<p>This course has been designed for students to learn and understand</p> <ul style="list-style-type: none"> <li>The safety control measures in handling foods from harvest to consumption agencies of control.</li> <li>Good agricultural and horticultural practices for food safety management.</li> <li>Importance of pre-harvest physiology for the long term storage of horticultural crops.</li> </ul>
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**Prerequisite** To learn the concepts of post harvest handling of foods.

**Course Outcomes (COs)**

CO Number	Course Outcomes (COs) Statement	Bloom's Taxonomy Knowledge Level
CO1	Identify the role of Post Harvest Technology in combating malnutrition in India.	K1
CO2	Categorize the agents causes food spoilage.	K2
CO3	Examine the physical and chemical methods to control insects and rodents.	K3
CO4	Prioritize the Importance of storage structures for food grains. Explain the agencies that control food losses.	K4
CO5	Improve the product-process efficiency of food grain.	K5

**Mapping with Program Outcomes:**

COs / POs	PO1	PO2	PO3	PO4	PO5
CO1	✓		✓	✓	
CO2		✓			✓
CO3				✓	
CO4	✓			✓	
CO5	✓	✓			





## Syllabus

Unit	Content	Hours	E-Contents / Resources
I	<p>Post harvest Technology</p> <p>Introduction to Post Harvest Technology - Definition, importance. Post harvest handling of perishables.</p> <p>Governmental measures to augment food production-need for food conservation.</p> <p>Food loss in the post harvest period, extent of losses, loss in the field, threshing yard, storage, marketing loss</p> <p>Role of Post Harvest Technology in combating malnutrition in India</p>	9	Textbook
II	<p>Agent causing food loss</p> <p>Agents Causing Food Losses - Physical agents (moisture, temperature), Chemical losses, biological losses- insects-insects attacking food grains - types and life cycle,damage caused to food grains and detection of insect infestation, rats and rodents, birds, animals- Nature of damage, identification</p>	10	Textbook
III	<p>Spoiling Agents</p> <p>Control of Spoilage Agents - Importance and methods of sanitary handling, physical, chemical, biological and other means of control of insects, rats and rodents and birds Insect control methods- Physical methods and chemical methods including fumigation techniques</p> <p>Handling and Transport of Food Commodities - Traditional and improved methods, Nutrient losses in spoiled grains and National program to save grains</p>	10	Textbook
IV	<p>Storage and grains</p> <p>Storage of Grains - Importance of storage structures-requirements, traditional and modern and underground and above ground storage and their improvements, PDS.</p>	11	Textbook
V	<p>Food Processing</p> <p>Food Processing of Selected Food Items – wheat, rice, breakfast cereals, pulses,oilseeds. Agencies Controlling Food Losses - Role of SGC, FCI, CWC, EPA SWC, IGSI in controlling food losses</p>	8	Textbook
	<b>Total</b>	<b>48</b>	


<b>Text Books</b>	1.	Potter ,N.W 1973. &quot;Food Science&quot;. 8th Edn. The A VI Publishing Co. the Westport.
	2.	Chakravarthy ,A 1981 &quot;Post Harvest Technology of Cereals, Pulses and Oilseeds&quot;., 1st Edn., Oxford and IBH. NewDelhi.
<b>Reference Books</b>	1.	Boumans,G 2012. &quot; Grain Handling and Storage &quot;. 4th Edn. Elsevier Science Publishing

<b>Journal and Magazines</b>	<a href="https://www.frontiersin.org/journals/sustainable-food-systems">https://www.frontiersin.org/journals/sustainable-food-systems</a> <a href="http://jpht.in/">http://jpht.in/</a> <a href="https://www.inderscience.com/jhome.php?jcode=ijpti">https://www.inderscience.com/jhome.php?jcode=ijpti</a>
<b>E-Resources and Website</b>	<a href="https://fmipa.umri.ac.id/wp-content/uploads/2016/03/Amalendu_Chakraverty_Arun_S._Mujumdar_HosahalliBookFi.org_.pdf">https://fmipa.umri.ac.id/wp-content/uploads/2016/03/Amalendu_Chakraverty_Arun_S._Mujumdar_HosahalliBookFi.org_.pdf</a>

<b>Learning Method</b>	Chalk and Talk/Assignment/ Seminar
<b>Focus of the Course</b>	Skill Development/ Employability/ Entrepreneurial Development

D. Jha.

BoS Chairman/HoD  
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<b>APPROVED</b>		
BoS- 17 <sup>th</sup>	AC- 17 <sup>th</sup>	GB -
05-04-24	17-04-24	

