

# **BANGALORE UNIVERSITY**



## **Course Structure and Curriculum for**

**FOOD TECHNOLOGY – Core Discipline**

**B.Sc. (Basic) (Hons.) & Integrated M.Sc.**

**CHOICE BASED CREDIT SYSTEM (CBCS)**

**I – X SEMESTERS**

**Framed According to the National Educational Policy**

**(NEP 2020)**

**To implement from the Academic Year 2021-2022**

**B.Sc. with Food Technology as a  
Major/Minor Subject &  
M.Sc. Food Technology  
(Model II A)**

## Preamble

Education is an essential means of knowledge and most powerful tool that bring growth and progress to the individual, society and the Nation at large. The higher education system in India has grown in a remarkable way as a powerful tool to build a knowledge-based information society of the 21<sup>st</sup> Century. The new paradigm shift in education system is to create learning that leads to student centered learning. Alongwith creating new knowledge, acquiring new capabilities, producing an intelligent human resource pool among students, new system of education must be more experiential, holistic, integrated and learner centered. Additionally, the students should feel they are welcomed and cared for, with a safe and stimulating learning environment, a wide range of learning experiences, and good physical infrastructure and appropriate resources conducive to learning.

The National education policy 2020 states that Education must move towards less content, and more towards learning about how to think critically and solve problems, how to be creative and multidisciplinary, and how to innovate, adapt, and absorb new material in novel and changing fields. Pedagogy must evolve to make education more experiential, holistic, integrated, inquiry-driven, discovery-oriented, learner-centered, discussion-based, flexible, and, of course, enjoyable. The curriculum must include basic arts, crafts, humanities, games, sports and fitness, languages, literature, culture, and values, in addition to science and mathematics, to develop all aspects and capabilities of learners; and make education more well-rounded, useful, and fulfilling to the learner.

Education must build character, enable learners to be ethical, rational, compassionate, and caring, while at the same time prepare them for gainful, fulfilling employment. These skills are becoming more essential for professional and personal participation in society. In this direction and to bridge a gap between the current state of learning outcomes and what is required for the present generation to compete globally, the National Education Policy-2020(NEP-2020) has been prepared to bring in the highest quality, equity, and integrity into the system, from early childhood care and education through higher education. NEP-2020 definitely serves the purpose of the

education system developing good human beings capable of rational thought and action, possessing compassion and empathy, courage and resilience, creating potential of each individual, scientific temper and creative imagination, with sound ethical moorings and values. It aims at producing engaged, productive, and contributing citizens for building an equitable, inclusive, and plural society as envisaged by our Constitution.

Hence, this Policy proposes the revision and revamping of all aspects of the education structure, including its regulation and governance, to create a new system that is aligned with the aspirational goals of 21st century education. With this vision, Hon'ble Deputy Chief Minister and Minister for Higher Education and also Chairman for Higher Education Council, Government of Karnataka, initiated to implement the NEP- 2020 effectively as a First state in the country by constituting various committees comprising Educational Experts. Home sciences is one such committee headed by Dr. Ravikumar Patil H.S., Professor, Department of studies in Food Technology, Davangere University, Davangere working with Eminent Scholars for inclusiveness of Home Sciences in higher education building the Nation to higher rank in the world.

## Model Curriculum

Name of the Degree Program: **B.Sc. Honors and M.Sc.**

Discipline Core: **Food Technology**

Total Credits for the Program: **230**

Starting year of implementation: **2021-22**

Program Outcomes:

By the end of the program the students will be able to: -

PO 1	<b>Disciplinary Knowledge:</b> Bachelor's degree in Food Technology helps to apply the knowledge of science, engineering fundamentals, and mathematical concepts to the solution in the field of food technology science and other allied subjects
PO 2	<b>Communication Skills:</b> Communicate effectively and write effective reports and design documentation, make effective presentations through seminars, project dissertations
PO 3	<b>Critical thinking and analytical reasoning:</b> Recognize the need for, and have the preparation and ability to engage in independent/as an entrepreneur and life-long learning in the broadest context of technological change logical reasoning and capability of recognizing and distinguishing the various aspects of real-life problems.
PO 4	<b>Problem Solving:</b> Identify, formulate, review research literature, and analyze complex Food Technology/applications problems and Design solutions for complex problems and design system components or processes that meet the specified needs with appropriate consideration for the food sustainability
PO 5	<b>Research related skills:</b> Acquire the practical knowledge and demonstrate the ability to design, conduct/trouble shoot experiments and analyze data in the field of food technology
PO 6	<b>Information/digital Literacy:</b> The completion of this programme will enable the learner to use appropriate software's to apply for bulk scale

	/Industrial production of technology-based food products
PO 7	<b>Self-directed learning:</b> The student completing this program will develop an ability of working independently and to make an in-depth study of various disciplines of food technology.
PO 8	<b>Moral and ethical awareness/reasoning:</b> Understand the impact of the professional food technology solutions in societal and environmental contexts, and apply ethical principles and commit to professional ethics and Responsibilities
PO 9	<b>Lifelong learning:</b> This programme provides self-directed learning and lifelong learning skills to think independently and develop problem solving skills with respect to food industry.
PO 10	Ability to peruse advanced studies and research in Allied fields of Food science.

**Assessment:**

**Weightage for assessments (in percentage)**

Type of Course	Formative Assessment / IA	Summative Assessment
Theory	40	60
Practical	20	30
Projects	40	60
Experiential Learning (Internships etc.)	40	60

**Contents of Courses for B.Sc. with Food Technology as Major Subject  
& B.Sc. (Hons) Food Technology**

**Model IIA**

Semester	Course No.	Theory/ Practical	Credits	Paper Title	Marks	
					S.A.	I.A.
I	FTT1.1	Theory	4	Fundamentals of Food Technology	60	40
	FTP1.1	Practical	2	Practical based on Fundamentals of Food Technology	30	20
	Minor*	Theory	4		60	40
	Minor*	Practical	2		30	20
	FTT1.2	Theory	3	Food Safety	60	40
	FTTL1		3	Language 1	60	40
	FTTL2		3	Language 2	60	40
	FTTSEC1		2	Digital fluency /Bioanalytical techniques (optional)	30	20
	FTTVB1		2	Yoga , Health and Wellness	30	20
II	FTT2.1	Theory	4	Food Chemistry	60	40
	FTP2.1	Practical	2	Theory based Practical's on Food Chemistry	30	20
	Minor*		4		60	40
	Minor*		2		30	20
	FTT2.2	Theory	3	Food And Nutrition	60	40
	FTTAEC1	Theory	2	Environmental Studies	30	20
	FTTL3	Theory	3	Language 1	60	40

Semester	Course No.	Theory/ Practical	Credits	Paper Title	Marks	
					S.A.	I.A.
	F TTL4	Theory	3	Language 2	60	40
	F TTVB2		2	Sports/NCC/NSS	30	20
<b>Exit Option with Certificate in Food Technology (50 Credits)</b>						
III	F TT3.1	Theory	4	Food Analysis	60	40
	F TP3.1	Practical	2	Theory based Practical's on Food Analysis	30	20
	Minor*	Theory	4		60	40
	Minor*	Practical	2		30	20
	F TT3.2	Theory	3	Nutraceutical and functional foods	60	40
	F TT3.3	Theory	2	Processing of Spices and Plantation Crops/ Artificial Intelligence	30	20
	F TTL5	Theory	3	Language-1	60	40
	F TTL6	Theory	3	Language-2	60	40
	F TTVB3		2	Sports/NCC/NSS	30	20
IV	F TT4.1	Theory	4	Food Quality	60	40
	F TP4.1	Practical	2	Theory based Practical's on Food Quality	30	20
	Minor*	Theory	4		60	40
	Minor*	Practical	2		30	20
	F TT4.2	Theory	3	Brewing and Fermentation Technology	60	40
	F TTL7	Theory	3	Language 1	60	40



Semester	Course No.	Theory/ Practical	Credits	Paper Title	Marks	
					S.A.	I.A.
	FTTL8	Theory	3	Language 2	60	40
	FTTAEC2	Theory	2	Constitution of India	30	20
	FTTVB4		2	Sports /NCC/NSS	30	20
<b>Exit Option with Diploma in Food Technology (100 Credits)</b>						
Choose any one discipline as major and other as minor						
V	FTT5.1	Theory	3	Food Microbiology, Contamination and Preservation of Foods (Major)	60	40
	FTP5.1	Practical	2	Theory based Practical's on Food Microbiology, Contamination and Preservation of Foods (Major)	30	20
	FTT5.2	Theory	3	Bakery and Confectionery Technology	60	40
	FTP5.2	Practical	2	Theory based Practical's Bakery and Confectionaries Technology	30	20
	Minor*	Theory	3		60	40
	Minor*	Practical	2		30	20
	FTTVOC1	Theory	3	Food Product Development	60	40
	FTT SEC 3	Theory	2	CYBER SECURITY	30	20
	FTTVB5		2	Sports/NCC/NSS	30	20
VI	FTT6.1	Theory	3	Food Processing Technology (major)	60	40

Semester	Course No.	Theory/ Practical	Credits	Paper Title	Marks	
					S.A.	I.A.
	FTP6.1	Practical	2	Theory based Practical's on Food Processing Technology (major)	30	20
	FTT6.2	Theory	3	Processing Of Oils and Fats (major)	60	40
	FTP6.2	Practical	2	Theory based Practical's on Processing of Oils and Fats (major)	30	20
	Minor*	Theory	3		60	40
	Minor*	Practical	2		30	20
	FTTVOC 2	Theory	3	FOOD ANALYSIS	60	40
	FTT INT1		2			
	FTTSEC4	Theory	2	Professional/societal communication	60	40
	FTTVB6		2	SPORTS/NCC/NSS		
<b>Exit Option with Bachelor of Science Degree in Food Technology (146 Credits)</b>						
VII	FTT7.1	Theory	3	Processing Technology f Meat, Poultry and Fish	60	40
	FTP7.1	Practical	2	Theory based Practical's on Processing Technology of Meat, Poultry and Fish	30	20
	FTT7.2	Theory	3	Post-Harvest and Storage Engineering	60	40
	FTP7.2	Practical	2	Theory based Practical's on Post Harvest and Storage Engineering	30	20
	FTT7.3	Theory	3	Food Refrigeration and Cold Storage	60	40
	FTT7.4	Theory (DSE1)	3	Beverage Technology	60	40
	FTT7.5	Theory (DSE2)	3	Functional Foods/ Statistics for Food Technology	60	40
	FTT7.6	Theory	3	Research Methodology	60	40
	FTT8.1	Theory	3	Food Adulteration and Food Toxicology and Sensory Evaluation	60	40

VIII	FTT8.2	Theory	4	Food engineering and enzymes in food Processing	60	40
	FTT8.3	Theory	3	Food Extrusion Technology	60	40
	FTT8.4	Theory (DSE3)	3	Food Laws and Regulations	60	40
	FTT8.5	Theory (DSE4)	3	Food Analysis	60	40
	FTT8.5	Research Project	6	Research Project	120	80
<b>Award of Bachelor of Bachelor of Science Honors in Food Technology (189 Credits)</b>						

**M.Sc. degree in Food Technology (Two Semesters)**

Semester	Course Number	Theory/ Practical	Credits	Title of the Course	S.A.	I.A.
I	PGFTT1.1	Theory	3	Dairy Technology	60	40
	PGFTP1.1	Practical	2	Theory based Practical's on Dairy Technology	30	20
	PGFTT1.2	Theory	3	Food product Development	60	40
	PGFTP1.2	Practical	2	Theory based Practical's on Food product Development	30	20
	PGFTT1.3	Theory	3	Food Packaging Technology	60	40
	PGFTP1.3	Practical	2	Theory based Practical's on Food Packaging Technology	30	20
	PGFTT1.4	Theory	3	Value Addition In Food Product	60	40
	PGFTT1.5	Theory	3	Food Products Industrial Byproduct	60	40
II	PGFTT2.1	Theory	3	Fundamentals of Nutraceutical	60	40
	PGFTP2.2	Practical	2	Theory based Practical's on Fundamentals of Nutraceutical	30	20
	PGFTT2.3	Theory	3	Post-Harvest Management of Fruits and Vegetables	60	40
	PGFTT2.4	Theory	3	Food additives and Biostatistics	60	40
	PGFTT2.5	Theory	3	Entrepreneurship Development	60	40
	PGFTT2.6		6	Dissertation/ Project	140	60
Award of Post Graduate degree in Food Technology						



**CURRICULUM STRUCTURE FOR UNDERGRADUATE DEGREE  
B.Sc. FOOD TECHNOLOGY  
SEMESTER 1**

**Total Credits for the Program:** 230 credits

**Starting year of implementation:** 2021-2022

**Name of the Degree Program:** B. Sc Degree / Honors and M.Sc.

**Discipline/Subject:** Food Technology

**Program Articulation Matrix:**

This matrix lists only the core courses. Core courses are essential to earn the degree in that discipline/subject. They include courses such as theory, laboratory, project, internships etc. Elective courses may be listed separately.

Semester	Course No.	Programme Outcomes that the Course Addresses	Pre-Requisite Course(s)	Pedagogy	Assessment
I	DSC- 1 Fundamentals Of Food Technology	PO 1, PO 2, PO 3	12 <sup>th</sup> / Equivalent	<ul style="list-style-type: none"> <li>•MOOC</li> <li>•PROBLEM SOLVING</li> <li>•LECTURE</li> </ul>	Formative and Summative Assessment
	OE- 1 Food Safety	PO 1, PO 2, PO 3	12 <sup>th</sup> / Equivalent	<ul style="list-style-type: none"> <li>•MOOC</li> <li>•PROBLEM SOLVING</li> <li>•LECTURE</li> </ul>	Formative and Summative Assessment
II	DSC -2 Food Chemistry	PO 1, PO 2, PO 3	12 <sup>th</sup> / Equivalent	<ul style="list-style-type: none"> <li>• MOOC</li> <li>• PROBLEM SOLVING</li> <li>• LECTURE</li> </ul>	Formative and Summative Assessment
	OE- 2 Food and Nutrition	PO 1, PO 2, PO 3	12 <sup>th</sup> / Equivalent	<ul style="list-style-type: none"> <li>•MOOC</li> <li>•PROBLEM SOLVING</li> <li>•LECTURE</li> </ul>	Formative and Summative Assessment

## B.Sc. FOOD TECHNOLOGY SEMESTER 1

**COURSE TITLE: FUNDAMNTALS OF FOOD TECHNOLOGY (DSC 1)**

Number of Theory Credits	Number of lecture hours/semester
3	45

CONTENT	45 Hrs
<b>Unit 1: Classification of Plant foods, Sources and Composition</b>	<b>15Hrs</b>
<p><b>Cereals and Millets:</b> General outline, Sources, Composition &amp; Nutritive value of wheat and Rice. Millets – Major and Minor millets - Composition and Nutritive value. <b>Pulses and Legumes:</b> Sources, Composition, Nutritive value, Anti-nutritional factors. Changes during cooking, Factors affecting cooking the Germination - Changes during germination. Role of Pulses in cookery. <b>Nuts &amp; Oilseeds:</b> Composition, sources, Nutritive Value, Toxic Constituents – Role of Oilseeds in cookery. <b>Fruits and Vegetables:</b> Classification of fruits and vegetables, general composition, enzymatic browning, names and sources of pigments and Dietary fiber. Post-harvest changes in fruits and vegetables, Changes during storage of fruits and vegetables</p>	
<b>Unit 2: Classification of Animal foods, Sources and Composition</b>	<b>15 Hrs</b>
<p><b>Eggs:</b> Structure, Composition, Nutritive value, Grading of eggs Changes during storage. Egg Cookery. <b>Fish:</b> Composition, Nutritive value, Fish cookery. <b>Meat:</b> Structure Composition, Nutritive value-curing, tenderizing ageing, Meat cookery. <b>Poultry:</b> Classification,</p>	

composition, and nutritive value. Poultry Cookery. <b>Milk:</b> Definition of milk, chemical composition of, processing of milk, pasteurization, homogenization. Milk Cookery.	
<b>Unit 3 : Principles and Methods of Food Processing</b>	<b>15 Hrs</b>
Principles of Food Preservation. Food Spoilage: Microbial, physical, chemical and miscellaneous. Preservation by low temperature- chilling, refrigeration and Freezing –Preservation by high temperature -Thermal processing, pasteurization and blanching, Sterilization, Liquid concentration, Dehydration and Canning, Extrusion. Preservation by Fermentation, pickling, Preservation by sugar and salt, Preservation by chemical additives, preservatives, ozone treatment and smoking. Preservation by radiation - Emerging Preservation Technologies-Natural antimicrobials, hydrostatic pressure, electric pulse, light pulse, high magnetic pulse.	

**Practical: 2 Credits**

**60 hours**

1. To study the different types of browning reactions: enzymatic and non-enzymatic.
2. Gelatinization and Microscopic Structure of Food Starches
3. To study the concept of gluten formation of various flours.
4. To study malting and germination.
5. To study dextrinization in foods.
6. Determination of pH in food sample
7. Determination of acidity in Food Sample
8. Determination of Vitamin C in Foods
9. Identification of pigments in fruits and vegetables and influence of pH on them.
10. Determining smoking point of different oils
11. Evaluation of egg quality parameters
12. Determination of Fat in milk



## REFERENCES

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Kenneth F. et al, edited-Vol-1, 2, The Cambridge World History of Food, Cambridge Univ.Press, 2000.
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## B.Sc. FOOD TECHNOLOGY SEMESTER 1

<b>Course Title: FOOD SAFETY (OE- 1)</b>	
Total Contact Hours: 45	Course Credits: 3
Formative Assessment Marks: 40	Duration of ESA/Exam: 3 hours
Model Syllabus Authors:	Summative Assessment Marks: 60

**Course Pre-requisite(s):** PUC/ 10+2 (with chemistry or biology as one optional)

### Course Outcomes (COs):

At the end of the course the student should be able to:

1. Explain the application of food quality and food safety system
2. Identify the hazard of the food chain to ensure food safety
3. Describe the effect and consequences of food borne illness.
4. Identify measures /procedures that will reduce or eliminate accidents in food industry.
5. Review of legislative approaches for the management of food safety

### Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-12)

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Explain the application of food quality and food safety system			✓												
Identify the hazard of the food chain to ensure food safety		✓													
Describe the effect and consequences of food borne illness		✓													
Identify measures /procedures that will reduce or eliminate accidents in food industry		✓													

Review of legislative approaches for the management of food safety						✓													
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## B.Sc. FOOD TECHNOLOGY SEMESTER 1

**Title of the Course: FOOD SAFETY (OE- 1)**

Number of Theory Credits	Number of lecture hours/semester
3	45

<b>CONTENTS</b>	<b>45 Hrs</b>
<b>Unit 1: INTRODUCTION TO FOOD SAFETY</b>	<b>15 Hrs</b>
Concept and meaning of Food Safety, food adulteration, food hazards Food laws and regulations – National (FSSAI) and international (FAO) food laws, newer approaches to food safety. PFA, FPO, Food Safety and Standards Bill 2005, International Laws and Agreements - FAO, WHO, Codex Alimentarius, Governing bodies, Exposure, estimation, toxicological requirements, and risk analysis. Safety aspects of water and beverages, Safety assessment of food contaminants and pesticide residues.	
<b>UNIT 2: SAFETY DURING PROCESSING</b>	<b>15 Hrs</b>
HACCP: Desirable safety features of some food processing equipment; Personal protective equipment; Safety from adulteration of food. Role of maintenance staff and plant operators; Preventive maintenance; Guidelines for good maintenance & safety precautions; Lubrication & lubricants; Work place improvement through '5S'.	
<b>UNIT 3: HYGIENE AND SANITATION IN FOOD INDUSTRY</b>	<b>15 Hrs</b>
Hygiene and sanitation requirement in food processing and fermentation industries; Cleaning, sanitizing and pest control in food processing; storage and service areas. Hygiene and sanitation requirement in food processing and fermentation industries; Cleaning, sanitizing & pest control in food processing; storage and service areas.	

<b>Formative Assessment = 100 marks</b>	
<b>Assessment Occasion / type</b>	<b>Weightage in Marks</b>
Test 1	10
Test 2	10
Assignment + Project	5 + 5
<b>Total</b>	<b>60 marks + 40 marks = 100 marks</b>

## REFERENCES

1. Food Safety Management, A Practical Guide for the Food Industry Editors: Yasmine Motarjemi Huub Lelieveld, eBook ISBN: 9780123815057, Hardcover ISBN: 9780123815040, Academic Press.
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## B.Sc. FOOD TECHNOLOGY SEMESTER 2

<b>Course Title: FOOD CHEMISTRY (DSC- 2)</b>	
Total Contact Hours: 45	Course Credits: 3
Formative Assessment Marks: 40	Duration of ESA/Exam: 3 hours
Model Syllabus Authors:	Summative Assessment Marks: 60

**Course Pre-requisite(s):** PUC/ 10+2 (with chemistry or biology as one optional)

### Course Outcomes (COs):

At the end of the course the student should be able to:

- To understand the chemistry of foods, composition of food, role of each component and their interaction.
- To understand the functional aspects of food components and to study their role in food processing.
  - To understand the importance of water for stability and quality of foods
  - To understand the overview of the main classes of compounds influencing colour and flavour of food and have knowledge on important sources of vitamins and minerals in food

### Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-12)

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
To understand the chemistry of foods, composition of food, role of each component and their interaction.			✓												
To understand the functional aspects of food components and to study their role in food processing		✓													
To understand the importance of water for stability and quality of foods		✓													
To understand the overview of the main classes of compounds influencing colour and flavour of food and have knowledge on important sources of vitamins and minerals in food				✓											

## B.Sc. FOOD TECHNOLOGY SEMESTER 2

**Title of the Course: FOOD CHEMISTRY (DSC- 2)**

Number of Theory Credits	Number of lecture hours/semester
3	45

	<b>45 Hrs</b>
<b>UNIT 1: Introduction</b>	<b>15 Hrs</b>
<p>Physicochemical properties of water, water weak interactions in Aqueous Systems, ionization of water, weak acids, and weak bases, buffering against pH changes in biological systems, water as a reactant, water activity and its influences on food quality and stability. Role of water in food.</p> <p><b>Carbohydrate:</b> Introduction, classification, structure, sources, properties and functions of carbohydrates, functional properties of sugars, starch, cellulose, glucans, hemicelluloses, gums, pectin substances, polysaccharides, Modified starch, and dietary fibre. Dietary requirements of carbohydrates.</p>	
<b>UNIT 2: Amino acids and Proteins</b>	<b>15 Hrs</b>
<p>Amino acids, occurrence, structure, classification, physical &amp; chemical properties. Peptides, polypeptide, proteins &amp; their properties, major source of proteins, classification, structure, properties, purification and denaturation of proteins, physicochemical and functional properties of protein derived from milk, egg protein, meat protein, fish muscle protein, oil seed protein and cereal protein. Protein- protein interaction, Protein- lipid interaction, protein-lipid complexes, and protein-carbohydrate complexes. Modified proteins and application in food industry. Dietary requirements of proteins.</p>	

<b>UNIT 3: Enzymes, Lipids and Vitamins</b>	<b>15 Hrs</b>
<p>General introduction to Enzymes, classification and functions of Enzymes and its activity in different food systems, factors affecting rate of enzymatic action, commercial availability, immobilization of enzymes, importance of enzymes in food processing. <b>Lipids:</b> General introduction, classification, physical and chemical properties, functions, and Dietary requirements of food lipids, refining of crude oil and fats, hydrogenation, winterization shortenings and low-fat spreads. Vegetable and animal fat, margarine, lard, butter. Flavour changes in fats and oils, lipid oxidation, auto oxidation, factors affecting lipid oxidation and its biological significance, metabolic defects such as cardiovascular disease associated with lipids. <b>Vitamins:</b> Physiological and biochemical role of fat- and water-soluble vitamins, functions, and sources. Vitamin C, Vitamin B complex, Iron and Folic acid. Requirements and recommended allowances. Deficiency diseases.</p>	

**Practical: 2 Credits**

**60 Hours**

1. Qualitative Tests of Carbohydrate (Molisch's Test, Fehling's Test, Benedict Test, Iodine Test, etc.)
2. Quantitative Determination of Carbohydrate by Phenol Sulphuric acid method
3. Estimation of carbohydrate by DNS method
4. Isolation of starch from given sample.
5. Determination of total sugar in food
6. Determination of reducing sugar in food.
7. Qualitative analysis of Amino acids
8. Estimation of protein by Lowry's method
9. Estimation of Vitamin C in food sources
10. Estimation of Vitamin A in food sample
11. Estimation of Saponification value and acid value in oil sample
12. Estimation of Iodine value and Peroxide value in oil sample



13. Test for detection of different oils (Baudouin test, Halphens test, hexabromide test)

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**B.Sc. FOOD TECHNOLOGY  
SEMESTER 2**

<b>Course Title: FOOD AND NUTRITION (OE- 2)</b>	
Total Contact Hours: 45	Course Credits: 3
Formative Assessment Marks: 40	Duration of ESA/Exam: 3 hours
Model Syllabus Authors:	Summative Assessment Marks: 60

**Course Pre-requisite(s):** PUC/ 10+2 (with chemistry or biology as one optional)

**Course Outcomes (COs):**

At the end of the course the student should be able to:

- Understand the relationship between food, nutrition and health.
- Understand the functions of food.
- Understand digestion, absorption and function of various nutrients and their sources.
- To utilize the knowledge from foundational sciences as a basis for understanding the role of nutrients in health and disease

**Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-12)**

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Understand the relationship between food, nutrition, and health.			✓												
Understand the functions of food		✓													
Understand digestion, absorption and function of various nutrients and their sources		✓													
To utilize the knowledge from foundational sciences as a basis for understanding the role of nutrients in health and disease.		✓	✓												

## B.Sc. FOOD TECHNOLOGY SEMESTER 2

**Title of the Course: FOOD AND NUTRITION (OE-2)**

Number of Theory Credits	Number of lecture hours/semester
3	45

CONTENTS	45 Hrs
<b>Unit 1: Basics of Energy</b>	<b>15 Hrs</b>
<p>Energy units - Kilocalories, Megajoules, determination of energy value of foods, using Bomb calorimeter, diagram of Bomb Calorimeter - gross calorific values, Physiological energy, value of foods, relation between oxygen used and calorific value.</p> <p><b>METABOLISM:</b> Determination of energy requirements, direct calorimetry. Relation between Respiratory quotient and energy output - Specific dynamic action of food (Thermogenic food in REE) indirect calorimetry - Basal metabolism - definition, determination - benedict Roth basal Metabolism Apparatus - factors affecting BMR - determination of energy metabolism, during work. - Energy requirements for various types of activities, factorial methods for calculation of the daily energy requirements of an adult for varying degrees of physical activity - recommended allowances for calories, energy requirements of adults expressed in terms of reference man and reference woman - FAO committee and ICMR committee percent calories supplied by carbohydrates, fats, and proteins in average Indian diets - Energy requirements for different age groups.</p>	
<b>Unit 2: CARBOHYDRATES AND PROTEINS</b>	<b>15 Hrs</b>
<p>Proteins - Composition - structure and classification, function of protein, Amino acids Indispensable and dispensable amino acids - special function of amino acids - protein deficiency - Protein Energy Malnutrition. - KWASHIORKOR and MARASMUMS - etiology, clinical features, treatment, and prevention - Evaluation of protein quality-</p>	

<p>PER, BV, NPU and NPR, chemical Score , mutual and amino acid supplementation of proteins.</p>	
<p><b>UNIT 3: FATS A LIPIDS</b></p>	<p><b>15 Hrs</b></p>
<p>Understanding relationship between food, nutrition, and health. Functions of food-physiological, psychological, and social. Concept of balanced diet. Lipids - Classification, Composition function - essential fatty acids, deficiency, food sources of EFA, Function of TGL, Characteristics of animal and vegetable fats, sterols - cholesterol - function, food sources, phospholipids - function, ketone bodies - fat requirements - food sources, dietary lipids, and their relation to the causation of Atherosclerosis and ischemic heart diseases. Nutrients – Classification, Functions, Dietary sources, RDA. Fat soluble vitamins - A, D, E and K. Water soluble vitamins - thiamin, riboflavin, niacin, pyridoxine, folate, vitamin B12 and vitamin C. Minerals- Role of Ca, P, Fe, Na, K, I, F, Se.</p>	

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