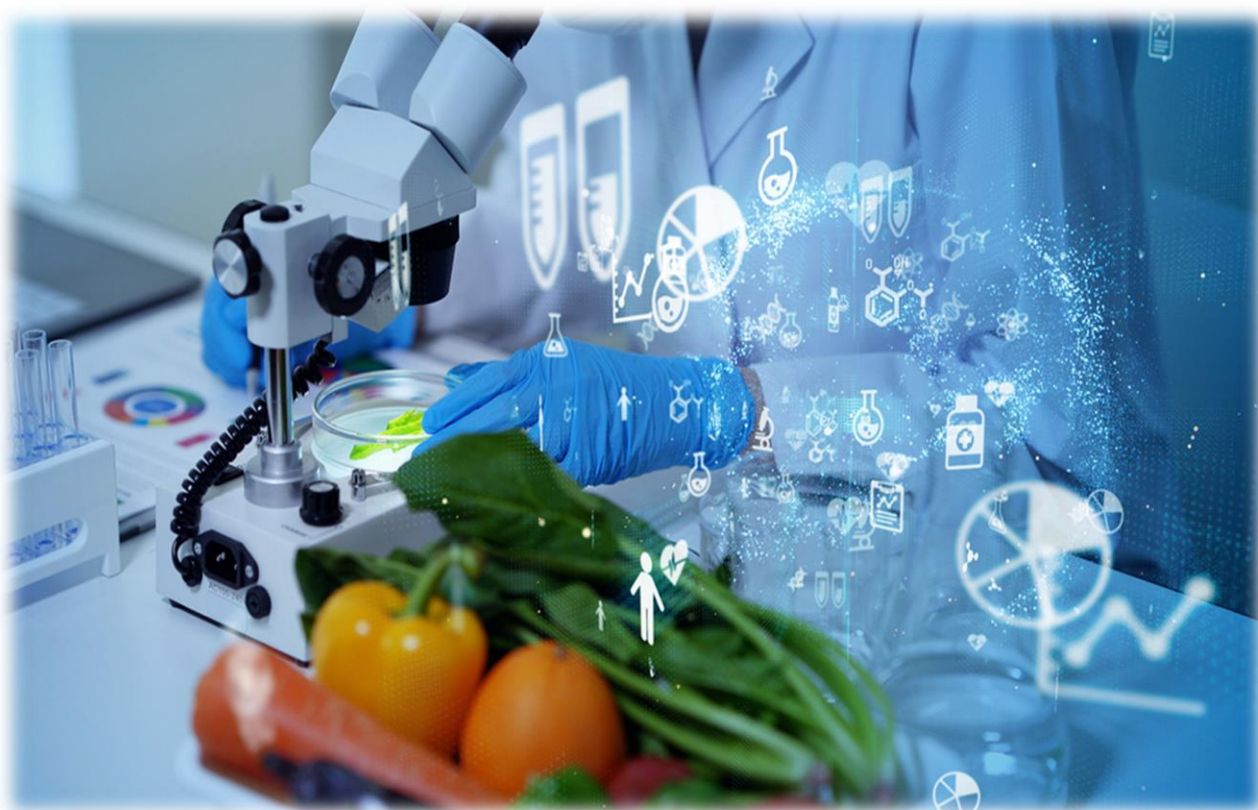




**Government of Karnataka**

**Curriculum Framework for Four-Year Undergraduate  
Multidisciplinary Programme (Honours) & Master Programme in  
Colleges and Universities of Karnataka State Under NEP 2020.**



**3<sup>rd</sup> and 4<sup>th</sup> Semesters Model Syllabus  
for  
BSc. in  
Food Technology**

**Submitted to  
Vice Chairman**

Karnataka State Higher Education Council  
30, Prasanna Kumar Block, Bengaluru City University Campus,  
Bengaluru, Karnataka – 560009

## Composition of Subject Expert Committee Members

SN	Name & Organization	Designation
1	Dr. Ravikumar Patil, Professor, Davanagere University, Davanagere	Chairman
2	Dr. Asna Urooj, Professor, University of Mysore, Mysore.	Member
3	Dr. Renuka Meti, Assoc. Professor, KSAW University, Vijayapura	Member
4	Dr. C. Usha Devi, Assoc. Professor, Maharani Cluster University, Bangalore.	Member
5	Dr. Archana Prabhat, Professor, Alvas college, Moodabidri.	Member
6	Dr. R Shekhara Naik, Professor, Yuvaraja's College, Mysore	Member
7	Dr. Rajeshwari, Assoc. Professor, Maharani's Science College for Women, Mysore	Member
8	Dr. Mahesh M. S., Assoc. Professor, Yuvaraja's College, Mysore	Special Invitee
9	Dr. Tejaswini B Yakkundimath Special Officer, Karnataka State Higher Education Council	Member, Convener
10	Smt. Rajani B Special Officer, Karnataka State Higher Education Council	

## Contents of Courses for B.Sc. Honours in Food Technology (Model)

Semester	Course Category	Theory / Practical	Credits	Paper Title	Marks	
					S. A	I.A
3	DSC- 3.1	Theory	3	Legumes and Oil Seeds Technology	60	40
		Practical	2	Legumes and Oil Seeds Technology	25	25
	DSC- 3.2	Theory	3	Fruits and Vegetable Technology	60	40
		Practical	2	Fruits and Vegetable Technology	25	25
	DSC- 3.3	Theory	3	Operations in Food Processing	60	40
	OE- 3.1	Theory	3	Food Adulteration	60	40
4	DSC- 4.1	Theory	3	Dairy Technology	60	40
		Practical	2	Dairy Technology	25	25
	DSC- 4.2	Theory	3	Baking and Confectionary Technology	60	40
		Practical	2	Baking and Confectionary Technology	25	25
	DSC- 4.3	Theory	3	Food laws and Food Safety	60	40
<b>Exit option with Undergraduate Diploma with completion of courses equivalent to a minimum of 96 credits followed by 10 - 12 credit bridge course(s) for 2 months, including at least 6 credit jobs specific internship / apprenticeship to acquire job ready competencies required to enter a job</b>						

**OE Papers to be offered for the students other than Food technology**

**Model Curriculum  
of  
BSc Honours  
in  
Food Technology  
3<sup>rd</sup> and 4<sup>th</sup> Semesters**

**Karnataka State Higher Education Council**



Government of Karnataka

## Model Curriculum

Program Name	<b>B Sc Food Technology</b>	Semester	<b>Third Semester</b>
Course Title	<b>Legumes and Oil Seeds Technology (Theory + Practical)</b>		
Course Code:	<b>DSC-3.1</b>	No. of Theory +Practical Credits	<b>3+2 = 5</b>
Contact hours	<b>45 hrs</b>	Duration of ESA/Exam	<b>2 Hours</b>
Formative Assessment Marks	<b>40</b>	Summative Assessment Marks	<b>60</b>

<b>Course Pre-requisite(s): Certificate on completion of First Year BSc Food Technology</b>	
<b>Course Objectives:</b> 1. To create awareness about the processing of major cereals like paddy, maize etc 2. To study the storage and handling techniques of cereals. 3. To study about the by-products obtained during processing along with their uses. 4. To gain knowledge on processing and milling of cereals and pulses.	
<b>Course Outcomes (COs):</b> Student will acquire the knowledge on CO 1. Students will learn about different process involved in cereal and legume processing. CO 2. Develop skills on the treatment and processing of the grain from cereal and legume. CO 3. Develop skill of preparation of different byproducts of cereals and legumes.	
<b>Theory Content</b>	<b>45 Hrs</b>
<b>Unit-1</b>	<b>15</b>
Present status and future prospects of legumes and oilseeds; Morphology of legumes and oilseeds; Classification and types of legumes and oilseeds, Chemical composition and nutritional value; Anti-nutritional compounds in legumes and oilseeds; Methods of removal of anti-nutritional compounds.	
<b>Unit -2</b>	<b>15</b>
Milling of legumes: home scale, cottage scale and modern milling methods, milling quality, efficiency and factors affecting milling; problems in dhal milling industry, Soaking and germination of pulses. Products, fermented products of legumes.	

<b>Unit -3</b>	15
<p>Cooking quality of legumes – factors affecting cooking quality.</p> <p>Oilseeds: composition, methods of extraction, Desolventization and refining of oils: degumming, neutralization bleaching, filtration, deodorization, etc. New technologies in oilseed processing, Utilization of oil seed meals for food uses i.e. high protein products like concentrate, isolates By-product of pulses and oil milling and their value addition.</p>	

<b>Formative Assessment:</b>	
<b>Assessment Occasion/ type</b>	<b>Weightage in Marks</b>
Test 1	10
Test 2	10
Assignment	05
Seminar	05
Project	10
<b>Total</b>	<b>40 Marks</b>
<i>Formative Assessment as per NEP guidelines are compulsory</i>	
<i>Summative Assessment (60 marks) + Formative Assessment (40 marks) = Total 100 marks</i>	

Course Title	<b>Legumes and oil Seed Technology (Practical)</b>	Practical Credits	<b>2</b>
Course Code	<b>DSC (P)-3.1</b>	Contact Hours	<b>54 hrs</b>
Formative Assessment Marks	<b>25 marks</b>	Summative Assessment Marks	<b>25 marks</b>

### Content of Practical

<i>Sl. No.</i>	<i>Title of Experiments</i>
1	Determination of physical properties of legumes and oil seeds
2	Determination of proximate composition of selected pulses and oilseeds
3	Determination of nutritional quality of selected pulses and oilseeds
4	Study of mini dhal mill
5	Study of mini oil mill
6	Preconditioning of pulses before milling
7	Preconditioning of oilseeds before milling.
8	Removal of anti-nutritional compounds from selected pulses and oilseeds
9	Laboratory milling of selected pulses and its quality evaluation
10	Laboratory milling of selected oilseeds and its quality evaluation
11	Laboratory refining of selected oils
12	Laboratory hydrogenation of selected oils
13	Study of cooking quality of dhal.
14	Processing of composite legume mix and preparation of value-added products
15	Visit to commercial dhal mills and oil mills.

### Formative Assessment:

<b>Assessment Occasion/ type</b>	<b>Weightage in Marks</b>
Test 1	05
Test 2	05
Practical Record	10
Participation and Involvement	05
<b>Total</b>	<b>25 Marks</b>

*Formative Assessment as per NEP guidelines are compulsory*

<b>References</b>	
1	Pulses Harbhajan Singh Agrotech Pub. Academy, 2005, ISBN: 9788183210140
2	Legumes Chemistry, Technology and Human Nutrition, Mathews RH Marcel Dekker, 1989
3	Post-harvest technology of cereals: pulses and oilseeds, Chakraverty A. Oxford & IG+BH publishing company, 1988, ISBN: 9788120402898
4	Bailey's Industrial Oil & Fat Products, Bailey A.E. and Shahidi F. Wiley Publication, 2005, ISBN: 9780471385462
5	Food Legumes, Kay DE, Tropical Products Institute, 1979
6	Food and Feed from Legumes and Oilseeds, Smartt J and Nwokolo E. Springer, 2012, ISBN: 9781461304333
7	Legumes and Oilseed Crops, Bajaj YPS, Springer, 2012, ISBN: 97836427444883
8	Handbook of Seed Science and Technology, Basra A., CRC Press, 2006, ISBN: 9781560223153





Government of Karnataka

Model Curriculum

Program Name	<b>B Sc Food Technology</b>	Semester	<b>Third Semester</b>
Course Title	<b>Fruit and Vegetable Technology (Theory + Practical)</b>		
Course Code:	<b>DSC-3.2</b>	No. of Theory +Practical Credits	<b>3+2 = 5</b>
Contact hours	<b>45 hrs</b>	Duration of ESA/Exam	<b>2 Hours</b>
Formative Assessment Marks	<b>40</b>	Summative Assessment Marks	<b>60</b>

<b>Course Pre-requisite(s): Certificate on completion of First Year BSc Food Technology</b>	
<b>Course Objectives:</b>	
<ol style="list-style-type: none"> <li>To learn about the various process of plant products undertaken in an industrial level</li> <li>To gain the knowledge about the post-harvest technology and the novel technologies in the processing of the products</li> </ol>	
<b>Course Outcomes (COs):</b> After successful completion of the course, students will be able to	
CO 1. Interpret the history and need of preservation along with the best-known canning and bottling process for all the related vegetable and fruit products.	
CO 2. Classify the science behind the processing and drying techniques of fruits and vegetables which leads to a final product with enhanced characteristics and shelf life.	
CO 3. Formulate and familiarize the reactions and changes taking place in fruits and vegetables, beverages, and spices during the overall processing.	
CO 4. Apply the technological ideas and methodologies to preserve the harvest and turn it into multiple uses.	
<b>Theory Content</b>	<b>45 Hrs</b>
<b>Unit-1</b>	15
<b>Introduction:</b> Importance of fruits and vegetables. History and need of preservation, reasons of spoilage, method of preservation.	
<b>Canning and bottling of Fruits and vegetable:</b> Selection of fruits and vegetables, process of canning, factors affecting the process- time and temperature, containers of packing, lacquering, syrups and brines for canning, spoilage in canned foods, Process of bottling, factors affecting the sterilization, factors affecting the quality of the bottles foods.	
<b>Fruits juices and tomato pulps:</b> Selection of fruits, Processing of fruit juices, preservation of fruit juices. Selection of tomatoes, pulping& processing of tomato juice, tomato puree, paste, ketchup, sauce and soup.	

<b>Unit -2</b>	15
<p><b>Fruit squashes, Jams, Jellies, Marmalades and candies:</b> Selection of fruits, Processing, essential constituents, types, technology and defects in Fruit squashes, Jams, Jellies, Marmalades and candies</p> <p><b>Pickles, Chutneys and Sauces:</b> Processing of pickles, chutneys and squashes, Types of pickles, chutneys and squashes, Causes of spoilage in pickling.</p> <p><b>Drying of Foods and Vegetables:</b></p> <p>Sun drying and mechanical drying of Food and Vegetables, process variation for fruits and vegetables, packing and storage.</p>	
<b>Unit -3</b>	15
<p><b>Spices:</b> Processing and properties of major and minor spices, essential oils &amp; oleoresins, adulteration.</p> <p><b>Tea, Coffee and Cocoa:</b> Processing of Tea, Coffee and Cocoa, Variety Tea, Coffee and Cocoa and its products.</p> <p><b>Browning:</b> Enzyme activity enzymic browning Non enzymic browning, its prevention.</p>	

<b>Formative Assessment:</b>	
<b>Assessment Occasion/ type</b>	<b>Weightage in Marks</b>
Test 1	10
Test 2	10
Assignment	05
Seminar	05
Project	10
<b>Total</b>	<b>40 Marks</b>
<i>Formative Assessment as per NEP guidelines are compulsory</i>	
<i>Summative Assessment (60 marks) + Formative Assessment (40 marks) = Total 100 marks</i>	

Course Title	<b>Fruit and Vegetable Technology (Practical)</b>	Practical Credits	<b>2</b>
Course Code	<b>DSC (P)-3.2</b>	Contact Hours	<b>54 hrs</b>
Formative Assessment Marks	<b>25 marks</b>	Summative Assessment Marks	<b>25 marks</b>

<b>Content of Practical</b>	
1	Estimation of total soluble solids (TSS).
2	Estimation of brix: acidity ratio
3	Estimation of ascorbic acid and effect of heat treatment on it.
4	To study the steps of artificial drying of vegetables.
5	Adulteration of spices.
6	Dehydration of fruits and vegetables.
7	Rehydration of fruits and vegetables.
8	Salting of vegetables.
9	Brining of vegetables.
10	Organoleptic changes during dehydration of vegetables and fruits.

<b>Formative Assessment:</b>	
Assessment Occasion/ type	Weightage in Marks
Test 1	05
Test 2	05
Practical Record	10
Participation and Involvement	05
<b>Total</b>	<b>25 Marks</b>
<i>Formative Assessment as per NEP guidelines are compulsory</i>	

<b>References</b>	
1	Girdharilal, Siddappaa, G.S and Tandon, G.L.1998. Preservation of fruits & Vegetables, ICAR, New Delhi
2	Crusess W B.2004. Commercial Unit and Vegetable Products, W.V. Special Indian Edition, Pub: Agrobios India

## References

3	Manay, S. & Shadaksharaswami, M.2004. Foods: Facts and Principles, New Age Publishers
4	Ranganna S.1986. Handbook of analysis and quality control for fruits and vegetable products, Tata Mc Graw-Hill publishing company limited, 2 <sup>nd</sup> edition.
5	Srivastava, R.P. and Kumar, S. 2006. Fruits and Vegetables Preservation- Principles and Practices. 3 <sup>rd</sup> Ed. International Book Distributing Co.
6	Manay, S. and Sharaswamy, M. 1987. Food Facts and Principles. Wiley Eastern Limited



Government of Karnataka

**Model Curriculum**

Program Name	<b>B Sc Food Technology</b>	Semester	<b>Third Semester</b>
Course Title	<b>Operations in Food Processing (Theory)</b>		
Course Code:	<b>DSC-3.3</b>	No. of Credits	<b>3</b>
Contact hours	<b>45 hrs</b>	Duration of ESA/Exam	<b>2 Hours</b>
Formative Assessment Marks	<b>40</b>	Summative Assessment Marks	<b>60</b>

<b>Course Pre-requisite(s): Certificate on completion of First Year BSc Food Technology.</b>	
<b>Course Objectives:</b> 1. To learn about the principles, techniques and processes required for unit operations.	
<b>Course Outcomes (COs):</b> After successful completion of the course, students will acquire knowledge on CO 1. Gain know-how regarding principles of unit operations. CO 2. Understand the principles underlying various types of food processing CO 3. Familiarize with unit operations and techniques in food processing CO 4. Apply the knowledge of unit operations in food industry	
<b>Theory Content</b>	<b>45 Hrs</b>
<b>Unit-1</b>	15
Theory Size reduction: Benefits, classification, sieve/screen analysis, principle and mechanisms of comminution of food, Rittinger's, Kick's and Bond's equations, work index, energy utilization; Size reduction equipment: Principal types, hammer mills and impactors, attrition mills, buhr mill, tumbling mills, tumbling mills, colloid mill, cutting machines (slicing, dicing, shredding, pulping);	
<b>Unit -2</b>	15
Mixing: Theory of solids mixing, criteria of mixer effectiveness and mixing indices, rate of mixing, Theory of liquid mixing, power requirement for liquids mixing; Mixing equipment: Mixers for low- or medium-viscosity liquids (paddle agitators, impeller agitators, powder-liquid contacting devices, other mixers), Mixers for high viscosity liquids and pastes, mixers for dry powders and particulate solids;	

<b>Unit -3</b>	15
<p>Mechanical Separations: Theory, centrifugation, liquid-liquid centrifugation, liquid-solid centrifugation, clarifiers, desludging machines; Filtration: Theory of filtration, rate of filtration, pressure drop during filtration, applications Filtration equipment; plate and frame filter press, rotary filters, centrifugal filters and air filters, filter aids; Membrane separation: General considerations, materials for membrane construction, Ultra-filtration, processing variables, membrane fouling, Applications of ultra-filtration in food processing, reverse osmosis, mode of operation, and applications, Membrane separation methods, gel filtration, ion exchange, per-evaporation and micro filtration.</p>	

<b>Formative Assessment:</b>	
<b>Assessment Occasion/ type</b>	<b>Weightage in Marks</b>
Test 1	10
Test 2	10
Assignment	05
Seminar	05
Project	10
<b>Total</b>	<b>40 Marks</b>
<i>Formative Assessment as per NEP guidelines are compulsory</i>	
<i>Summative Assessment (60 marks) + Formative Assessment (40 marks) = Total 100 marks</i>	

<b>References</b>	
1	Unit Operations of Chemical Engineering Warren LM, Julian Smith, Peter Harriott 7 th Ed. McGraw-Hill, Inc., NY, USA. 2004
2	Transport Processes and Separation Process Principles Christie John Geankoplis 4 th Ed. Prentice-Hall, NY, USA. 2003
3	Handbook of Food Processing Equipment Saravacos GD and Athanasios EK Springer Science+Business Media, New York, USA. 2002



Government of Karnataka

**Model Curriculum**

Program Name	<b>B Sc Food Technology</b>	Semester	<b>Third Semester</b>
Course Title	<b>Food Adulteration (Theory)</b>		
Course Code:	<b>OE-3.1</b>	No. of Credits	<b>3</b>
Contact hours	<b>45 hrs</b>	Duration of ESA/Exam	<b>2 Hours</b>
Formative Assessment Marks	<b>40</b>	Summative Assessment Marks	<b>60</b>

<b>Course Pre-requisite(s): Certificate on completion of First year BSc Food Technology</b>	
<b>Course Objectives:</b> 1. To educate about common food adulterants and their detection. 2. To impart knowledge in the legislative aspects of adulteration. 3. To educate about standards and composition of foods and role of consumer.	
<b>Course Outcomes (COs):</b> After successful completion of the course, students will be able to: CO 1. Get basic knowledge on various foods and about adulteration. CO 2. Understand the adulteration of common foods and their adverse impact on health CO 3. Comprehend certain skills of detecting adulteration of common foods. CO 4. Be able to extend their knowledge to other kinds of adulteration, detection and remedies. CO 5. Know the basic laws and procedures regarding food adulteration and consumer protection.	
<b>Theory Content</b>	<b>45 Hrs</b>
<b>Unit-1: Adulteration – Introduction</b>	<b>14</b>
<ul style="list-style-type: none"><li>• Definition – Types;</li><li>• Common Foods subjected to Adulteration - Poisonous substances, Foreign matter, Cheap substitutes, Spoiled parts. New adulterants in foods</li><li>• Adulteration through Food Additives – Intentional and incidental.</li><li>• General Impact on Human Health</li></ul>	
<b>Unit -2:</b>	<b>15</b>
<ul style="list-style-type: none"><li>• Adulteration of Common Foods and Methods of Detection</li><li>• Means of Adulteration</li></ul>	

<ul style="list-style-type: none"> <li>• Methods of Detection Adulterants in the following Foods: Milk, Oil, Grain, Sugar, Spices and condiments, processed food, Fruits and vegetables.</li> <li>• Historical Food legislation in India; Central food laboratory, Municipal laboratories,</li> </ul>	
<b>Unit -3: Energy</b>	16
<ul style="list-style-type: none"> <li>• Present Laws and Procedures on Adulteration: Highlights of Food Safety and Standards Act 2006 (FSSA)</li> <li>• Food Safety and Standards Authority of India–Rules and Procedures of Local Authorities.</li> <li>• Consumer protection: Role of voluntary agencies such as, Ag mark, I.S.I. Quality control laboratories of companies, Private testing laboratories,</li> <li>• Quality control laboratories of consumer co-operatives.</li> <li>• Consumer education, Consumer’s problems rights and responsibilities, COPRA 2019 - Offenses and Penalties – Procedures to Complain – Compensation to Victims.</li> </ul>	

<b>Formative Assessment:</b>	
<b>Assessment Occasion/ type</b>	<b>Weightage in Marks</b>
Test 1	10
Test 2	10
Assignment	05
Seminar	05
Project	10
<b>Total</b>	<b>40 Marks</b>
<i>Formative Assessment as per NEP guidelines are compulsory</i>	
<i>Summative Assessment (60 marks) + Formative Assessment (40 marks) = Total 100 marks</i>	

<b>References</b>	
1	A first course in Food Analysis – A.Y. Sathe, New Age International (P)Ltd.,1999
2	Food Safety, case studies–Ramesh. V. Bhat, NIN,1992
3	<a href="https://old.fssai.gov.in/Portals/0/Pdf/Draft_Manuals/Beverages and confectionary.pdf">https://old.fssai.gov.in/Portals/0/Pdf/Draft_Manuals/Beverages and confectionary.pdf</a>
4	<a href="https://cbseportal.com/project/Download-CBSE-XII-Chemistry-Project-FoodAdulteration#gsc.tab=0">https://cbseportal.com/project/Download-CBSE-XII-Chemistry-Project-FoodAdulteration#gsc.tab=0</a> (Downloadable e material on food adulteration)
5	<a href="https://www.fssai.gov.in/">https://www.fssai.gov.in/</a>



## References

6	<a href="https://indianlegalsolution.com/laws-on-food-adulteration/">https://indianlegalsolution.com/laws-on-food-adulteration/</a>
7	<a href="https://fssai.gov.in/dart/">https://fssai.gov.in/dart/</a>
8	<a href="https://byjus.com/biology/food-adulteration/">https://byjus.com/biology/food-adulteration/</a>



Government of Karnataka

## Model Curriculum

Program Name	<b>B Sc Food Technology</b>	Semester	<b>Fourth Semester</b>
Course Title	<b>Dairy Technology (Theory + Practical)</b>		
Course Code:	<b>DSC-4.1</b>	No. of Theory +Practical Credits	<b>3+2 = 5</b>
Contact hours	<b>45 hrs</b>	Duration of ESA/Exam	<b>2 Hours</b>
Formative Assessment Marks	<b>40</b>	Summative Assessment Marks	<b>60</b>

<b>Course Pre-requisite(s): Certificate on completion of First Year BSc Food Technology</b>	
<b>Course Objectives:</b> 1. To learn about the varied processing of dairy products undertaken in an industrial level 2. To gain the knowledge about the post-harvest technology and the novel technologies in the processing of the products	
<b>Course Outcomes (Cos):</b> After successful completion of the course, students will be able to: CO 1. Acquire the basic knowledge of developments in dairy industries. CO 2. Comprehend the recent advances in processing of dairy products. CO 3. Acquire the knowledge in manufacturing of different dairy products. CO 4. Understand about types of dairy plants and working principles of dairy instruments. CO 5. Gain knowledge regarding hygiene and sanitation practices in the milk and milk products industry	
<b>Theory Content</b>	<b>45 Hrs</b>
<b>Unit-1</b>	<b>15</b>
<b>Dairy industry:</b> Review of dairy development in India. Dairy industry in India and abroad. Co-operative dairying, Market survey; milk production & consumption pattern, national and global markets. Clean milk production & hygienic handling of raw milk. Milk collection/procurement and pricing. <b>Recent developments in dairy sector:</b> Dehydration, UHT processing, types of UHT plants, aseptic fillers, heat stability and deposit formation aspects, retort processing, use of bio-protective factors for preservation of raw milk and their effects on physicochemical, microbial, and nutritional properties of milk and milk products. Packaging of dairy products.	

<b>Unit -2</b>	15
<p><b>Dairy products:</b> Fluid milk: Full cream, standardized, toned &amp; double toned milk, reconstituted, rehydrated, and recombined milk, flavoured milk.</p> <p>Traditional dairy products, Fat-rich dairy products, Heat and acid coagulated milk products, Cheese (types and manufacture process), value added dairy products, ice-cream and frozen desserts, imitation dairy products, By-products Technology (Processing and utilization of whey, ghee residue, casein – classification and applications).</p>	
<b>Unit -3</b>	15
<p><b>Dairy Plant Management:</b> Principles of dairy plant design, classification of dairy plants, Instrumentation and process control, microbial quality and safety in dairy industry, HACCP, GMP/GHP practices in dairy processing. Waste Disposal and Pollution Abatement, Current trends in cleaning and sanitization of dairy equipment.</p>	

<b>Formative Assessment:</b>	
<b>Assessment Occasion/ type</b>	<b>Weightage in Marks</b>
Test 1	10
Test 2	10
Assignment	05
Seminar	05
Project	10
<b>Total</b>	<b>40 Marks</b>
<i>Formative Assessment as per NEP guidelines are compulsory</i>	
<i>Summative Assessment (60 marks) + Formative Assessment (40 marks) = Total 100 marks</i>	

Course Title	<b>Dairy Technology (Practical)</b>	Practical Credits	<b>2</b>
Course Code	<b>DSC (P)-4.1</b>	Contact Hours	<b>54 hrs</b>
Formative Assessment Marks	<b>25 marks</b>	Summative Assessment Marks	<b>25 marks</b>

<b>Practical Contents</b>	
1	Rapid tests for evaluation of milk quality- Clot on boiling test, alcohol test, alizarin alcohol test, phosphatase, acidity, turbidity
2	Chemical analysis of milk and determination of its components like fat, SNF, protein and TSS.
3	Preparation and quality evaluation of milk products: Heat desiccated/ Heat – acid
4	coagulated milk products, Cultured milk products, Fat rich products, Puddings / desserts
5	By product utilization experiments (Whey and ghee residue)
6	Visit to dairy plant.

<b>Formative Assessment:</b>	
<b>Assessment Occasion/ type</b>	<b>Weightage in Marks</b>
Test 1	05
Test 2	05
Practical Record	10
Participation and Involvement	05
<b>Total</b>	<b>25 Marks</b>

*Formative Assessment as per NEP guidelines are compulsory*

<b>References</b>	
1	Products. Dairy India Yearbook Publications, New Delhi. 2002.
2	Gupta P. R., Dairy India, 5 <sup>th</sup> Ed., New Delhi. 1997.
3	Robinson R. K., Modern dairy Technology, 2nd Ed., Chapman and Hall, New York. 1994.
4	Subbulaksmi G and Shobha A. Udipi, Food processing and preservation, New age international, 2008.
5	<a href="#">D.B. Puranik</a> , Dairy plant management, New India Publishing Agency. 2014
6	De Sukumar, Outlines of dairy: Technology, 1st edition, Oxford, 2001.



Government of Karnataka

## Model Curriculum

Program Name	<b>B Sc Food Technology</b>	Semester	<b>Fourth Semester</b>
Course Title	<b>Bakery and Confectionery Technology (Theory + Practical)</b>		
Course Code:	<b>DSC-4.2</b>	No. of Theory +Practical Credits	<b>3+2 = 5</b>
Contact hours	<b>45 hrs</b>	Duration of ESA/Exam	<b>2 Hours</b>
Formative Assessment Marks	<b>40</b>	Summative Assessment Marks	<b>60</b>

<b>Course Pre-requisite(s): Certificate on completion of First Year BSc Food Technology</b>	
<b>Course Objectives:</b> 1. To familiarize the students about the bakery and confectionary industry. 2. To understand and examine the technologies used in different industries.	
<b>Course Outcomes (COs):</b> After successful completion of the course, students will be able to: CO 1. To understand and identify methods and products used in bakery industry. CO 2. Apply the knowledge of the various technologies in bakery industries. CO 3. Define and describe the manufacturing methods and general technical aspects of confectionary industry. CO 4. Identify and explain about the extruded food product industry	
<b>Theory Content</b>	<b>45 Hrs</b>
<b>Unit-1</b>	<b>15</b>
<b>Baking Industry:</b> Global status of Baking industry, Introduction to baking, Bakery ingredients and their functions, traditional bakery products; Modern bakery product. <b>Baking methods:</b> Various methods of production and effect of ingredients, formulations and process parameters on quality, machinery used in baking industry. <b>Bakery Products:</b> Bread, bread rolls, sweet yeast dough products, biscuits, wafer, cookies and crackers, Multi grain bread and gluten free products	
<b>Unit -2</b>	<b>15</b>
<b>Bakery Product Quality:</b> Rheological testing of dough- Farinograph, mixograph, extensograph, amylograph/ rapid visco analyzer, Falling number; Microbiological aspects of different bakery products – prevention of bacterial rope and mold infection	

**Bakery plants sanitation:** Bakery hygiene and sanitation including control of rodents and pests. Bread faults – causes and remedies; Bread staling – theory, manifestation, retardation measures

**Cakes:** Cake flour specifications; ingredients, manufacturing process and quality evaluation; Basic methods of cake preparations, variety cakes and doughnuts, rusks, crackers, buns, muffins, pizza; Icings, glazers, creams, fondants, frostings; Cake recipe balancing, faults and remedies; Preparation of basic custards, pudding; Mousse.

**Unit -3**

15

**Confectionery industry:** Global status of confectionery industry; Raw materials, quality parameters; production, types, applications.

**Confectionery manufacture:** Raw materials and processing; cocoa, sugar, special fats, dried milk products, emulsifiers; chocolate processing- compound coatings, candy bars, tempering, enrobing technology, chocolate shells.

**Sugar confectionery:** General technical aspects, manufacture of boiled sweets, lollipops, lozenges, gums and jellies, chewing gums, caramel, toffee, fudge. Indian Confectionery – Types, role of sugar in preparation, other ingredients and their role in preparation

<b>Formative Assessment:</b>	
<b>Assessment Occasion/ type</b>	<b>Weightage in Marks</b>
Test 1	10
Test 2	10
Assignment	05
Seminar	05
Project	10
<b>Total</b>	<b>40 Marks</b>
<i>Formative Assessment as per NEP guidelines are compulsory</i>	
<i>Summative Assessment (60 marks) + Formative Assessment (40 marks) = Total 100 marks</i>	

Course Title	<b>Bakery and Confectionery Technology (Practical)</b>	Practical Credits	<b>2</b>
Course Code	<b>DSC (P)-4.2</b>	Contact Hours	<b>54 hrs</b>
Formative Assessment Marks	<b>25 marks</b>	Summative Assessment Marks	<b>25 marks</b>

### Practical Contents

1	Introduction to bakery equipments
2	Determination of ash content of the given sample of white wheat flour
3	Estimation of water absorption power and gluten content of the given flour.
4	Determination of alcoholic acidity of the given sample of wheat flour.
5	Determination of sedimentation value of white wheat flour
6	Determination of yeast quality by its dough rising capacity
7	Preparation of plain biscuit in laboratory
8	Preparation of egg less cake.
9	Preparation of bread by straight dough method.
10	Microbial flora of aging bakery items.
11	Sensory characteristics of the baked products.
12	Objective characteristics of biscuits.

#### Formative Assessment:

Assessment Occasion/ type	Weightage in Marks
Test 1	05
Test 2	05
Practical Record	10
Participation and Involvement	05
<b>Total</b>	<b>25 Marks</b>

*Formative Assessment as per NEP guidelines are compulsory*

#### References

1	Matz, Samuel A, Bakery Technology and Engineering, 3 <sup>rd</sup> Ed, CBS Publishers, 2008.
2	Stanley Cauvain and Linda Young, Baked Products- Science, Technology and practice, Blackwell

<b>References</b>	
	Publishing, 2006.
3	Amendola, Joseph and Nicole Rees, The Baker's Manual, 5 <sup>th</sup> Ed, Wiley, 2003.
4	Hamed Faridi and Jon M. Faubion, Dough Rheology and Baked Product Texture, CBS Publishers, 1997.
5	Duncan, Manley. Biscuit, Cookie and Cracker Manufacturing Manuals. Vol.1-6. Woodhead Publishing Harper JM. Extrusion of Food, Vol 2, CRC Press1981.
6	Matz SA. Bakery Technology & Engineering. AVI Pub. 1960.
7	Fance WJ and Wrogg BH. Up to-date Bread Making; Maclasen & Sons Ltd. 1968,
8	Kent-Jones DW and Amos AJ, Modern Cereal Chemistry, Food Trade Press Ltd. 1967
9	NIIR Board of Consultants & Engineers, The Complete Technology Book on Bakery Products (Baking Science with Formulation & Production) 3 <sup>rd</sup> Ed., 2014
10	<a href="#">Ashokkumar Y</a> , Textbook of Bakery and Confectionery, PHI India Pvt. Ltd., 2012
11	Stanley Cauvain and Linda Young, Baked Products- Science, Technology and practice, Blackwell Publishing, 2006.
12	Amendola, Joseph and Nicole Rees, The Baker's Manual, 5th Edition, Wiley, 2003.
13	Hamed Faridi and Jon M. Faubion, Dough Rheology and Baked Product Texture, CBS Publishers, 1997.





Government of Karnataka

## Model Curriculum

Program Name	<b>B Sc Food Technology</b>	Semester	<b>Fourth Semester</b>
Course Title	<b>Food Safety and Food Laws (Theory)</b>		
Course Code:	<b>DSC-4.3</b>	No. of Credits	<b>3</b>
Contact hours	<b>45 hrs</b>	Duration of ESA/Exam	<b>2 Hours</b>
Formative Assessment Marks	<b>40</b>	Summative Assessment Marks	<b>60</b>

<b>Course Pre-requisite(s): Certificate on completion of First Year BSc Food Technology.</b>	
<b>Course Objectives:</b> 1. To learn the principles and importance of food safety 2. To familiarize with the existing food laws and regulations	
<b>Course Outcomes (COs):</b> After successful completion of the course, students will be able to: CO 1. Understand the principles and importance of food safety. CO 2. Implement analytical techniques to assess food quality CO 3. Have the knowledge of and follow food laws and regulations at both national and international levels	
<b>Theory Content</b>	<b>45 Hrs</b>
<b>Unit-1</b>	<b>15</b>
Principles of Food Safety: Food Sanitation and safety: Factors contributing to physical, chemical and biological contamination in food chain, prevention and control of food borne hazards, definition and regulation of food sanitation, sources of contamination, personal hygiene-food handlers, cleaning compounds, sanitation methods, waste disposal strategy (solid and liquid waste) and pest control. Food adulteration: common adulterants, simple tests for detection of adulteration. Food additives classification, functional role and safety issues.	
<b>Unit -2</b>	<b>15</b>
Analytical Techniques for Food Quality Analytical method used for quality determination: chemical and physical, microbiological, biochemical and sensory analysis. Analytical methods of determination of basic food components: protein, saccharides, lipids, vitamins, water, minerals and trace elements, sensory active compounds, anti-nutritive and natural toxic compounds, food additives and food contaminants. Basic principles of chromatography. Paper Chromatography. Spectrophotometric techniques:	

Spectrophotometry introduction and principles.	
<b>Unit -3</b>	15
<p>Food Laws and Regulations Food Safety Systems: Quality systems standards including ISO; Auditing; Good Manufacturing Practice and HACCP. Food Laws &amp; Implementing Agencies-National: FSSAI. International Scenario in Food Regulation USFDA, EFSA, UK, Canada, A &amp; NZ, Japan, Malaysia, Singapore; Consumer Movements; Intellectual Property Rights and Trade Marks: Protection of investment and efforts in research and development by patenting; Criteria of patentability; National and international patent; Terms of patents; Copyright. International Agencies in Food Regulation: Food Codex Alimentarius: Various aspects and relation with domestic laws; FAO, WHO, WTO.</p>	

<b>Formative Assessment:</b>	
<b>Assessment Occasion/ type</b>	<b>Weightage in Marks</b>
Test 1	10
Test 2	10
Assignment	05
Seminar	05
Project	10
<b>Total</b>	<b>40 Marks</b>
<i>Formative Assessment as per NEP guidelines are compulsory</i>	
<i>Summative Assessment (60 marks) + Formative Assessment (40 marks) = Total 100 marks</i>	

<b>References</b>	
1	Sathe AV, A First Course in Food Analysis, New Age International Pvt. Ltd. 1999
2	Nielsen SS, Food Analysis, 3 <sup>rd</sup> ed., Kluwer Academic Publishers, 2003
3	Wrolstad RE, Acree TE, Decker EA, Penner MH and Reid DS, Handbook of Food Analytical Chemistry, John Wiley & Sons, 2004
4	Ali I, Food Quality Assurance: Principles and Practices, CRC Press, 2003
5	Vasconcellos JA, Quality Assurance in Food Industry: A Practical Approach, CRC Press, 2003
6	Hubbard MR, Statistical Quality Control for the Food Industry, Kluwer Academic/ Plenum Publishers, 2003
7	Pearson AM and Dutson TR, Kluwer HACCP in Meat, Poultry and Fish Processing, Academic Press Publishers, 1995
8	D'Mello J P F, Food Safety Contaminants and Toxins, Oxford University Press, 2003

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9	Shasidi F, Spanier AM, Chi-Tang Ho and Braggins T, Quality of Fresh and Processed Foods, Kluwer Academics/ Plenum Publishing, 2004
10	Jotbill I, Rapid and On-line Instrumentation for Food Quality Assurance, Woodhead Publishing, 2003
11	Nielsen SS, Food Analysis Laboratory Manual, Kluwer Academic Publishers, 2003