

**Sant Gadge Baba Amravati University, Amravati**  
**NEP Syllabus**  
**UG Programme**

**Faculty:** Science and Technology

**Programme:** B.Sc. (Food Science)

**Programme Outcomes (POs):**

**Students of undergraduate general degree programme at the time of graduation will be able to**

**PO1.Critical Thinking:** Take informed actions after identifying the assumptions that frame our thinking and actions, check out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.

**PO2.Effective Communication:** Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.

**PO3. Social Interaction:** Elicit views of others, mediate disagreements and help reach conclusions in group settings.

**PO4. Effective Citizenship:** Demonstrate empathetic social concern and equity centered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

**PO5. Ethics:** Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.

**PO6. Environment and Sustainability:** Understand the issues of environmental contexts and sustainable development.

**PO7. Self-directed and Life-long Learning:** Acquire the ability to engage in independent and life-long learning in the broadest contexts socio-technological changes.

**Programme Specific Outcomes (PSOs):**

**After completing the programme with subject Food Science the Students can be able to-**

1. Gain insight into food science including the history and fundamental properties of food
2. Acquire the skill in the use and care of basic food Science laboratory equipment
3. Perform basic laboratory procedures in food science.
4. Understand the integral role of food science and different branches of food science-related subjects.
5. Acquainted with the basic chemistry of food

➤ **Transferable Skills:**

During the course student will develop skills other than laboratory skills that are transferable across the number of career areas. These are:

- Analytical skill
- Report writing skill

- Presentation skill
- Time management
- Creative thinking
- Problem solving
- Planning
- Observational skill

### **Employability Potential of the Programme:**

It has been a long felt necessity to align higher education with the emerging needs of the economy so as to ensure that the graduates of higher education system have adequate knowledge and skills for employment and entrepreneurship. The higher education system has to incorporate the requirements of various industries in its curriculum, in an innovative and flexible manner to produce holistic and well groomed graduates.

Food Science is a branch of science that deals with study of food regarding its chemistry, benefits, nutrition, biochemistry, quality control, processing, etc. It includes the study related with food industries, adulteration and Government recognized agencies

The cumulative demand for trained and skilled manpower in the area of food science requires in-depth functional knowledge of food science and related subject through hands-on training. The syllabus has been prepared to anticipate the requirement of students under the NEP-2020. The contents have been drawn to accommodate the widening horizon of the subject and reflect the changing needs of the students. The detailed syllabus for each paper is appended with a list of suggested readings. The degree of Bachelor of Science with Food Science (NEP-2020) aims to explore various aspects of Food Science and interdisciplinary subjects. The program in Food Science as one of the core subjects is designed to cultivate a scientific attribute and interest in the area of Food Science and related subjects. This will help the students to become critical and curious in their outlook.

The course is designed to impart the essential basics of Food Science at the initial level. The basic course is infused with application in modern life science, and awareness of Food Science and its influence on human life. The integration of various courses in the program is aimed to develop proficiency in theory as well as practical experiments, common equipment, and laboratory, along with the collection and interpretation, and presentation of scientific data in a proper manner.

Besides this, the students will be equipped with knowledge in the newer area and its application in different sectors like nutrition, food production, processing, and preservation, adulteration, hygiene & sanitation, food laws and regulations, food microbiology, etc. This will create awareness and contribution of Food Science in society. At the end of the course, the students are expected to have good working knowledge in the field of food science and the interdisciplinary courses.

Food Science overcomes the challenges in food sector. The production of value-added food products is the greatest example. Almost all food industries need pure water. The bacterial quality of water is tested by a food scientist. The food industry provides large scope for food Scientists. Food Scientist always helps in introducing technology that aims to enhance the production, processing, packaging, and preservation of food production.

Students will surely have an urge to continue higher studies in the subject and contribute significantly to the development. The present syllabus is restricted to anticipating the future needs of

food Science with more emphasis on imparting hands-on skills. The main thrust is laid on making the syllabus compatible with developments in education, research, Industrial, and Govt. sectors. The theory and Practical course in the new restructured course will lead to impart skill set essential to further food Science.

After completion of the B.Sc. in Food science, students can do post graduation in Food and nutrition, food technology, and Food Science at different institutes and universities. Some examples are Kolhapur University, Paul University, Pune University, SNDT Mumbai and PGTD of Home Science, Sant Gadge Baba Amravati University, Amravati.

### **Summarized Carrier opportunities after doing B.Sc. with subject food science:**

Student opting for B. Sc. with Food science subject have opportunities in the field of food and nutrition as well as technology. Some of the avenues are listed below,

1. Teaching: Teaching profession can be chosen in the colleges and other institutions offering the courses related to food science, nutrition, catering and hotel management as well as nursing
2. In food Industries: As shift supervisors, production officers/ managers, quality control analyst, research scientist, purchasing, and marketing personals
3. In hospitals: As dietitians
4. In Government sectors: Food analysts (Food and Drugs)
5. In hotel industries: Chef, supervisors
6. Entrepreneurship: There is huge market of food and food products. Many food manufacturing units can be started in low investment as compared to other industries. So By completing these subjects they can start production of many products such as fruits candies, squash, juices, jams, jelly, ketchup, pickles, canned vegetables, bakery and confectionaries, spices, Indian snacks (Farsan, chevda, shev, chakli, etc.), potato, banana chips, milk and milk products, etc.

Hence, Board of Studies in Biochemistry (Including Microbiology and Food Science) in its meeting held on 16/12/2023 resolved to accept the revised syllabus for B. Sc. I Semester I and II (Food Science) based on Choice Based Credit System (CBCS) as per NEP guidelines. The detailed syllabus for each paper is appended with a list of suggested readings.

**Teaching and Learning Scheme: for the Degree of Bachelor of Science**  
**(Three Years- Six Semesters Bachelor's Degree Programme)**

**FIRST YEAR: SEMESTER – I**

Mode of Teaching	Vertical No.	The Vertical	Type of Course	Course Code	Course Name	Credits	Work load (Hrs/ Week)	Vertical Work load (Hrs / Week)
Classroom Teaching/ Lab Work (Practical) /Outdoor/ Field	a.	Major/ Minor Food Science 116	Theory 1	116200	Fundamentals of Food Science	2	2	6
			Lab/ Practical-1	116201	Fundamental techniques in Food Science	2	4	
	b.	Minor/ Major	Theory 1	-	-	2	2	6
			Lab/ Practical-2	-	-	2	4	
	c.	Generic/ Open Elective 116	Theory 1	116202	Principles of Food Preservation	2	2	4
			Theory 2	116203	Fundamentals of food processing	2	2	
	d.	SEC	Lab/ Practical-3	116204	Skills in determination of properties of food	2	4	4
	e.	AEC - English	Theory			1	1	6
		AEC –MIL	Theory			1	1	
		IKS- Generic	Theory			2	2	
		VEC	Theory			2	2	
	f.	CC	Outdoor			2	4	4
		<b>TOTAL</b>				<b>22</b>	<b>30</b>	<b>30</b>

**Course: B.Sc I Semester I (Food Science)**

<b>116200 Major Theory 1: Fundamentals of Food Science</b>							
<b>Level</b>	<b>Semester</b>	<b>Course code</b>	<b>Course Name</b>	<b>Credits</b>	<b>Teaching Hours</b>	<b>Exam Duration</b>	<b>Max marks</b>
4.5	I	116200	Fundamentals of Food Science	2	30	2Hrs	30

<b>Course Objectives</b>	<ul style="list-style-type: none"> <li>To acquaint the students with the basic concepts of food and nutrition.</li> <li>To update the students about features of different types of food groups and functions</li> <li>To impart knowledge regarding the physical properties of Food</li> <li>To recall the students regarding the units and dimensions</li> </ul>			
<b>Course Outcomes</b>	<p>Upon completion of this course successfully, students will be able to</p> <ul style="list-style-type: none"> <li>Categorize different food groups with their nutritional importance</li> <li>Categorize the physical properties of food</li> <li>Distinguish between the fundamental and derived quantities</li> <li>Differentiate between various types of solutions</li> <li>Classify acid and bases</li> </ul>			
<b>Unit System</b>	<b>Contents</b>	<b>Workload Allotted</b>	<b>Weightage of Marks Allotted</b>	<b>Incorporation of Pedagogies</b>
<b>Unit I Basics of food and nutrition</b>	Introduction to Food Science, Functions of Food, Food and health; Nutrients and their functions, balance diet, Malnutrition and over-nutrition; Food Groups, Food Pyramid; examples of acidic and basic food; Energy and its unit, Calorific value; Water: properties and types; functions and importance in body and in food processing; Hardness of water, water activity and shelf life of food, bound and unbound water;	<b>8 Hrs</b>	8 Marks	Chalk & Board, Power Point Presentation, Videos, Group Discussion, Assignments, surprise quizzes, question and answering sessions
<b>Unit II Units and mole concept</b>	Physical quantities and their units in various systems (mass, length, time, volume, area, force, pressure, density, temperature, heat, and specific gravity); Mole concept: Structure of atom; atomic number and weight; molecular and equivalent weight; mole, Concentration in percentage, ppm, molarity, and normality	<b>7 Hrs</b>	7 Marks	
<b>Unit III Dispersion s</b>	Dispersions: solutions, suspensions, and colloids, definitions & differences; Colloids: sol, gel, emulsions, foams, and their examples	<b>8 Hrs</b>	8 Marks	

	Solutions: types (saturated, unsaturated & supersaturated); Factors affecting solubility; Total soluble solids; brix; Refractometer; Emulsion & emulsifiers, Foams & foaming agents			
<b>Unit IV Physical properties of food</b>	Introduction to physical properties of food: Diffusion, boiling point, melting point, freezing point, osmosis, reverse osmosis, humidity, vapor pressure, surface tension, viscosity, evaporation; Distillation: types and application; Acids & bases: definitions and examples (organic and inorganic), pH & pH scale	<b>7 Hrs</b>	7 Marks	
<b>Reference s</b>	<ul style="list-style-type: none"> <li>Advanced Text Book on Food &amp; Nutrition (Volume I and II), Swaminathan M, The Bangalore Printing and Publishing Co.Ltd, Bangalore. 2006</li> <li>A First Course in Food Analysis, by A.Y. Sathe, New Age Int. Publication</li> <li>Basic principle of nutrition; Seema Yadav, Anmol publication Pvt. Ltd. New Delhi (1997)</li> <li>Encyclopedia of Foods – A Guide to Healthy Nutrition, Academic Press-An Imprint of Elsevier, San Diego, California</li> <li>Food Chemistry; L. H. Meyer.</li> <li>Food Facts &amp; Principle; Shakuntala Manay, M. Shadaksharaswamy; New Age International (p) Limited.</li> <li>Food- Nutrition and Health, Vijaya Khader; Kalyani Publishers</li> <li>Food Science &amp; Nutrition; Sunetra Roday; Oxford University Press.</li> <li>Food Science; Sumati R. Mudambi, Shalini M. Rao; New Age International (p) Limited</li> <li>Food Science; N. N. Potter.</li> <li>Nutrition &amp; Dietetics, Edition (I &amp; II), Subhangini Joshi.</li> <li>Nutrition Science; B. Srilakshmi; New Age International Publisher</li> <li>Nutritive Value of Indian Food; Dr. C. Gopalan NIN Hyderabad.</li> </ul>			
<b>Model Questions</b>	<b>Short Answer Questions</b> <ol style="list-style-type: none"> <li>1. Explain the concept of balance diet with appropriate examples</li> <li>2. Differentiate between micro and macro nutrients</li> <li>3. Explain the physiological functions of food</li> <li>4. Explain the social functions of food</li> <li>5. Justify the relation between balance diet and malnutrition</li> <li>6. Justify the relation between balance diet and over-nutrition</li> <li>7. Explain boiling point</li> <li>8. Differentiate between boiling point and melting point</li> <li>9. classify distillation</li> <li>10. classify units</li> <li>11. Relate density with mass.</li> <li>12. Classify dispersions with examples</li> <li>13. Differentiate between saturated and supersaturated solution</li> <li>14. Explain Brix</li> <li>15. Discuss the factors affecting the solubility of the solute</li> </ol>			

	16. justify the importance of emulsifiers in food processing 17. discuss the factors affecting foam formation 18. classify foaming agents 19. Illustrate the role of water as a solvent 20. What is distilled water? State the properties 21. State the importance of hardness of water 22. Establish the relation between water activity and shelf life 23. Define acid and base with examples 24. Explain pH  <b>Long Answer Questions</b> 1. Describe nutrition and classify nutrients with examples 2. Justify the importance of each food group with its functions 3. Summarize the functions of food 4. Elaborate the term balance diet and justify its relation with health and nutrition 5. List the important physical properties of food. Relate freezing point and boiling point 6. Explain energy. state the importance of calorific value of food 7. Classify units. Give the units of mass, temperature, volume, in SI, CGS and MKS system 8. Compare suspensions and colloids with examples 9. Classify colloids 10. Discuss solubility. explain the factors influencing solubility 11. Draw a diagram of refractometer. Explain the working 12. Justify the role of emulsifiers and foaming agents in food industries 13. Justify the role of water as a solvent, catalyst, and temperature regulator 14. Compare ground water with mineral and distilled water 15. Elaborate the role of moisture and water activity with the shelf life of food 16. Explain pH, pH scale and its importance 17. Compare the properties of acid and bases with examples 18. Draw a diagram showing the simple structure of atom 19. Calculate the molecular and equivalent weights of glucose
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**The distribution of marks for the Continues Assessment Test (CAT) shall be as follows:**

<b>Internal Assessment (Theory) for 20 marks</b>		
MCQ Test 1 base on 25% syllabus	Consider best 2 out of 3 test	10 Marks
MCQ Test 2 base on 50% syllabus		
MCQ Test 3 base on 75% syllabus		
Assignments /Innovative activities /GD/Seminar/ Poster presentation, quiz etc (any two activity 5 mark each)		10 Marks
<b>Total</b>		<b>20 Marks</b>

<b>116201 Lab 1: Fundamental techniques in Food Science</b>							
<b>Level</b>	<b>Semester</b>	<b>Course code</b>	<b>Course Name</b>	<b>Credits</b>	<b>Teaching Hours</b>	<b>Exam Duration</b>	<b>Max marks</b>
4.5	I	116201	Lab 1: Fundamental techniques in Food Science	2	60	2 Hrs	25+25

<b>Course Objectives</b>	<ul style="list-style-type: none"> <li>• To train the students in basic techniques in Food Science.</li> <li>• To educate students about food groups and nutrition</li> <li>• To introduce the students to handling and working of common equipments used in the Food Science laboratory.</li> <li>• To educate the students to determine physical properties of food</li> </ul>
<b>Course Outcomes</b>	<p>After completion of this course students will be able to</p> <ul style="list-style-type: none"> <li>• Handle various equipments in Food Science lab</li> <li>• Differentiate between various food groups</li> <li>• Determine physical properties of food</li> <li>• Prepare solutions of various concentration</li> </ul>

#### **List of Practical**

1. Introduction and study of various lab equipments
2. Identification and classification of various food items into the food groups
3. Anthropometric measurements of the students
4. Determination of boiling point
5. Determination of melting point
6. Determination of moisture content
7. Determination of density
8. Determination of specific gravity
9. Preparation of various types of solutions
10. Study of the factors affecting solubility
11. Measurement of brix
12. Preparation of emulsion and foam
13. Determination of hardness of water
14. Determination of pH
15. Determination of acidity and basicity by simple titration
16. preparation of solution of given normality, molarity, percentage, and ppm

#### **References**

- Asian Manual of Food Analysis, Institute of Nutrition, Mahidol University, Asean Foods, 2011
- Encyclopedia of Foods – A Guide to Healthy Nutrition, Academic Press-An Imprint of Elsevier, San Diego, California
- Handbook of Analysis and Quality Control for Fruits and Vegetables 2nd Edition; S. Ranganna.
- Manual of Methods of Analysis of Foods (Fruit and Vegetable Products), FSSAI, 2016
- Nutritive Value of Indian Food; Dr. C. Gopalan NIN Hyderabad
- UNIDO Technology Manual, Small-scale Fruit and Vegetable, Processing and Products, 2004



**The distribution of marks for the practical examination shall be as follows:**

<b>External Evaluation</b>		<b>Internal Evaluation based on CAT</b>	
Performance of any two experiments	20 marks	Attendance & Students performance	10 Marks
Viva-voce	05 marks	Practical Record Book	05 Marks
		MCQ test/ Viva-Voce	10 Marks
<b>Total</b>	25 Marks	<b>Total</b>	25 Marks

<b>116204 SEC Lab/Practical 3 : : Skills in determination of physical properties of food</b>							
<b>Level</b>	<b>Semester</b>	<b>Course code</b>	<b>Course Name</b>	<b>Credits</b>	<b>Teaching Hours</b>	<b>Exam Duration</b>	<b>Maximum marks</b>
4.5	I	116204	SEC : Skills in determination of properties of food	2	60	2Hrs	50

### **Course Objectives**

- To train the students to identify the food items of various groups
- To impart the skill of determining various physical properties of food
- To make students eligible to prepare different types of solutions
- To educate the students to apply the skills to prepare the emulsions and foams

**COs:** Upon completion of this course successfully, students will be able to

- Do focus on all the above objectives
- Calculate nutritional value of food
- Distinguish between the various properties of food
- Expertise in the preparation of solutions
- Apply the knowledge of distillation for separation of two materials

### **List of practical**

1. Use of various lab equipments
2. Calculation of nutritional values of the food
3. Standardization of the solutions
4. Numerical problems on the inter-conversion of units in various systems
5. Calculation of Molarity and Normality
6. Preparation of solutions for different experiments
7. Determination of boiling points of various liquid food
8. Use of various measuring apparatus
9. Study of solubility of sugar and salt
10. Measurement of brix of various products
11. Study the relationship of hardness of water with solubility and boiling point
12. Separation of salt from water by distillation
13. Preparation of distilled water
14. Determine moisture contents of various food items
15. Comparison of the properties of emulsions/ foams

### **References**

- Asian Manual of Food Analysis, Institute of Nutrition, Mahidol University, Asean Foods, 2011
- Encyclopedia of Foods – A Guide to Healthy Nutrition, Academic Press-An Imprint of Elsevier, San Diego, California
- Handbook of Analysis and Quality Control for Fruits and Vegetables 2nd Edition; S. Ranganna.
- Manual of Methods of Analysis of Foods (Fruit and Vegetable Products), FSSAI, 2016
- Nutritive Value of Indian Food; Dr. C. Gopalan NIN Hyderabad
- UNIDO Technology Manual, Small-scale Fruit and Vegetable, Processing and Products, 2004

<b>Internal Evaluation for SEC</b>	
Attendance	10 Marks
Practical performance	20 Marks
MCQ/ Viva	10 Marks
Practical Record book	10 Marks
<b>Total</b>	<b>50 Marks</b>

**Teaching and Learning Scheme: for the Degree of Bachelor of Science**  
**(Three Years- Six Semesters Bachelor's Degree Programme)**

**FIRST YEAR: SEMESTER – II**

Mode of Teaching	Vertical No.	The Vertical	Type of Course	Course Code	Course Name	Credits	Work load (Hrs/ Week)	Vertical Work load (Hrs / Week)
Classroom Teaching/ Lab Work (Practical) /Outdoor/ Field	a.	Major/ Minor Food Science 116	Theory 2	116205	Study of Basic Foodstuffs	2	2	6
			Lab/ Practical-4	116206	Practical Approach to the Basic Foodstuffs	2	4	
	b.	Minor/ Major	Theory 2	-	-	2	2	6
			Lab/ Practical-5	-	-	2	4	
	c.	Generic/ Open Elective 116	Theory 3	116207	Technology of Fruits and Vegetables Processing	2	2	4
			Theory 4	116208	Technology of Milk and Milk Products	2	2	
	d.	VSC	Lab/ Practical-6	116209	Techniques in Food Science Laboratory	2	4	8
		SEC	Lab/ Practical-7	116210	Basic Skills in Food Processing	2	4	
	e.	AEC - English	Theory			1	1	4
		AEC –MIL	Theory			1	1	
		VEC	Theory			2	2	
	f.	CC	Outdoor			2	4	4
		<b>TOTAL</b>				<b>22</b>	<b>32</b>	<b>32</b>

**Course: B.Sc I Semester II (Food Science)**

<b>116205 Theory 2: Study of Basic Foodstuffs</b>							
<b>Level</b>	<b>Semester</b>	<b>Course code</b>	<b>Course Name</b>	<b>Credits</b>	<b>Teaching Hours</b>	<b>Exam Duration</b>	<b>Max marks</b>
4.5	II	116205	Study of Basic Foodstuffs	2	30	2Hrs	30

<b>Course Objectives</b>	<ul style="list-style-type: none"> <li>To know the need and importance of study of basic food commodities</li> <li>To update the students about features of different types of foodstuffs and their functions</li> <li>To impart knowledge regarding the composition and classification of different food</li> <li>To recall the students regarding the commercial importance of foodstuffs</li> </ul>			
<b>Course Outcomes</b>	<p>Upon completion of this course successfully, students will be able to</p> <ul style="list-style-type: none"> <li>Categorize various grains according to the sources</li> <li>Explain the importance of fruits and vegetables in nutrition</li> <li>Justify the importance of protein rich foods like pulses, oil seeds, nuts, etc.</li> <li>Discuss the various milk and other animal food sources</li> <li>Justify the nutritional and commercial role of eggs and poultry</li> </ul>			
<b>Unit System</b>	<b>Contents</b>	<b>Workload Allotted</b>	<b>Weightage of Marks Allotted</b>	<b>Incorporation of Pedagogies</b>
<b>Unit I Grains and pulses</b>	Grains, cereals and millets: classification, composition, structure, nutritional and commercial importance; Pulses and legumes: classification, composition, nutritional and commercial importance	<b>8 Hrs</b>	8 Marks	Chalk & Board, Power Point Presentation, Videos, Group Discussion, Assignments, surprise quizzes, question and answering sessions
<b>Unit II Fats/oils, oil seeds, and nuts</b>	Fats and oils: classification, composition, nutritional and commercial importance; Various products such as margarine, mayonnaise, hydrogenated fat, etc.; Oil seeds: classification, composition, nutritional and commercial importance Nuts: classification, composition, nutritional and commercial importance	<b>7 Hrs</b>	7 Marks	
<b>Unit III Animal Products</b>	Milk and milk products: classification, composition, nutritional and commercial importance; An overview of types of market milk and milk products; Eggs: classification, composition, nutritional and commercial importance; Structure of hen's egg; Quality of egg, difference between broiler and layers. Meat and fish: classification, composition, nutritional and commercial importance	<b>8 Hrs</b>	8 Marks	

<b>Unit IV Fruits, Vegetables and Spices</b>	Fruits and Vegetables: Classification with examples, general composition; names and sources of pigments; Dietary fibres; Commercial and nutritional importance; Overview on the products of fruits and vegetables Spices and condiments: classification, composition, nutritional and commercial importance	<b>7 Hrs</b>	7 Marks	
<b>References</b>	<ul style="list-style-type: none"> <li>Advanced Text Book on Food &amp; Nutrition (Volume I and II), Swaminathan M, The Bangalore Printing and Publishing Co.Ltd, Bangalore. 2006</li> <li>A First Course in Food Analysis, by A.Y. Sathe, New Age Int. Publication</li> <li>Encyclopedia of Foods – A Guide to Healthy Nutrition, Academic Press-An Imprint of Elsevier, San Diego, California</li> <li>Food Chemistry; L. H. Meyer.</li> <li>Food Facts &amp; Principle; Shakuntala Manay, M. Shadaksharaswamy; New Age International (p) Limited.</li> <li>Food- Nutrition and Health, Vijaya Khader; Kalyani Publishers</li> <li>Food Science &amp; Nutrition; Sunetra Roday; Oxford University Press.</li> <li>Food Science; Sumati R. Mudambi, Shalini M. Rao; New Age International (p) Limited</li> <li>Food Science; N. N. Potter.</li> <li>Nutrition &amp; Dietetics, Edition (I &amp; II), Subhangini Joshi.</li> <li>Nutrition Science; B. Srilakshmi; New Age International Publisher</li> <li>Nutritive Value of Indian Food; Dr. C. Gopalan NIN Hyderabad.</li> </ul>			
<b>Model Questions</b>	<b>Short Answer Questions</b> <ol style="list-style-type: none"> <li>Differentiate between fats and oils</li> <li>Summarize the general composition of oil seeds</li> <li>Convince the importance of fats and oils in health and food processing</li> <li>Draw the structure of typical cereal grain</li> <li>Illustrate the importance of each part of the grain</li> <li>Explain the nutritional importance of grains</li> <li>Explain the nutritional importance of fats and oils</li> <li>Classify nuts with examples</li> <li>Convince the importance of nuts in nutrition</li> <li>Justify the importance of spices</li> <li>Classify the spices with examples</li> <li>Illustrate the difference between fruits and vegetables</li> <li>Explain the generalized composition of fruits and vegetables</li> <li>Discuss the nutritional importance of fruits and vegetables</li> <li>Justify the importance of processing in milk. Explain pasteurization of milk</li> <li>List of various types of milks and milk products in market</li> <li>Elaborate the nutritional and commercial importance of milk</li> <li>Draw a typical carcass</li> <li>Categorize the meat on the basis of its color and source</li> <li>Classify the fishes</li> <li>Discuss the nutritional importance of fish</li> <li>Differentiate between broiler and layers</li> <li>Relate the properties of eggs with its freshness</li> </ol>			

	24. Discuss the functional properties of eggs 25. Summarize the characteristics of fresh fish 26. Illustrate the commercial importance of fish  <b>Long Answer Questions</b> 1. Draw and explain the structure of wheat grain showing important parts 2. Explain the composition, nutritional and commercial importance of oil seeds 3. Classify spices on the basis of their use and give the importance 4. Explain the composition, nutritional and commercial importance of oil seeds 5. Classify fruits on the basis of its properties and nutrition 6. Draw the flow diagram of milk processing 7. Discuss the post harvest changes in the fruits and vegetables 8. Discuss the commercial and nutritional importance of fruits and vegetables in detail 9. Summarize the importance of dietary fibers with examples 10. Classify fish and give their processing 11. Draw a diagram of typical egg and explain the parts 12. Draw a structure of carcass and discuss its cuts
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**The distribution of marks for the Continues Assessment Test (CAT) shall be as follows:**

Internal Assessment (Theory) for 20 marks		
MCQ Test 1 base on 25% syllabus	Consider best 2 out of 3 test	10 Marks
MCQ Test 2 base on 50% syllabus		
MCQ Test 3 base on 75% syllabus		
Assignments /Innovative activities /GD/Seminar/ Poster presentation, quiz etc (any two activity 5 mark each)		10 Marks
Total		20 Marks

<b>116206 Lab 4: Practical Approach to the Basic Foodstuffs</b>							
<b>Level</b>	<b>Semester</b>	<b>Course code</b>	<b>Course Name</b>	<b>Credits</b>	<b>Teaching Hours</b>	<b>Exam Duration</b>	<b>Max marks</b>
4.5	II	116206	Lab 4: Practical Approach to the Basic Foodstuffs	2	60	2 Hrs	25+25

<b>Course Objectives</b>	<ul style="list-style-type: none"> <li>• To train the students in identifying basic food commodities</li> <li>• To educate students about the basic testing of foodstuffs</li> <li>• To determine the properties of food</li> <li>• To educate the students to perform the primary processing of food items</li> </ul>
<b>Course Outcomes</b>	<p>After completion of this course students will be able to</p> <ul style="list-style-type: none"> <li>• Do focus on all the above objectives</li> <li>• Perform the testing of food commodities</li> <li>• Determine properties of food items</li> <li>• Identify the quality of food items</li> <li>• Perform primary processing of foodstuffs</li> </ul>

#### **List of Practical**

1. Determination of acid/ saponification value of the given oil sample
2. Identification of various oil seeds
3. Identification and classification of different grains
4. Determination of 1000 grain weight of the given cereal sample
5. Gelatinization of the starch
6. Estimation of gluten from wheat flour
7. Identification of sources of various commercial food products
8. Identification of various spices and nuts
9. Study of juice extraction from fruits
10. Study of blanching of fruits and vegetables
11. Study and identification of various pigments in fruits and vegetables
12. Study of method of coagulation of protein
13. Study of method of fermentation of milk
14. Quality assessment of milk
15. Study of quality of eggs

#### **References**

- Asian Manual of Food Analysis, Institute of Nutrition, Mahidol University, Asean Foods, 2011
- Encyclopedia of Foods – A Guide to Healthy Nutrition, Academic Press-An Imprint of Elsevier, San Diego, California
- Handbook of Analysis and Quality Control for Fruits and Vegetables 2nd Edition; S. Ranganna.
- Manual of Methods of Analysis of Foods (Fruit and Vegetable Products), FSSAI, 2016
- Nutritive Value of Indian Food; Dr. C. Gopalan NIN Hyderabad
- UNIDO Technology Manual, Small-scale Fruit and Vegetable, Processing and Products, 2004

**The distribution of marks for the practical examination shall be as follows:**



External Evaluation		Internal Evaluation based on CAT	
Performance of any two experiments	20 marks	Attendance & Students performance	10 Marks
Viva-voce	05 marks	Practical Record Book	05 Marks
		MCQ test/ Viva-Voce	10 Marks
<b>Total</b>	25 Marks	<b>Total</b>	25 Marks

<b>116209 VSC Lab/Practical 6 : : Techniques in Food Science Laboratory</b>							
<b>Level</b>	<b>Semester</b>	<b>Course code</b>	<b>Course Name</b>	<b>Credits</b>	<b>Teaching Hours</b>	<b>Exam Duration</b>	<b>Maximum marks</b>
4.5	II	116209	VSC : Techniques in Food Science Laboratory	2	60	2Hrs	50

### **Course Objectives**

- To train the students in basic skills of using the equipment in the Food Science laboratory
- To impart the skill of application of various preliminary operations for the basic processing
- To educate the students about the applications of basic concepts in diet planning
- To train the students to apply the knowledge to compare the properties of food
- To impart the skill of use of a Brix meter to determine the total soluble solids

**COs:** Upon completion of this course successfully, students will be able to

- Do focus on all the above objectives
- Identify the oils by their properties
- Apply methods like blanching, fermentation, etc. for food processing
- Determine and compare the physical properties of food
- Handle the pH meter and Brix meter

### **List of practical**

1. Study of anthropometric measurements of the students
2. Planning of balance diet
3. Identification of oil from its acid/ saponification value
4. Comparison of gelatinization of the various starches
5. Comparison of various masalas
6. Study of juice extraction yield of various fruits
7. Comparison of blanching of different fruits and vegetables samples
8. Comparison of coagulation of protein by different methods
9. Performing gelatinization of the starch
10. Comparison of fermentation on different temperatures
11. Comparison of boiling point of water from different sources
12. Separation of two liquids by distillation
13. Determination of specific gravity of different liquid food
14. Use of emulsifiers/ foaming agents in the preparation of emulsion/foam
15. Study of various factors affecting the solubility

### **References**

- Asian Manual of Food Analysis, Institute of Nutrition, Mahidol University, Asean Foods, 2011
- Encyclopedia of Foods – A Guide to Healthy Nutrition, Academic Press-An Imprint of Elsevier, San Diego, California
- Handbook of Analysis and Quality Control for Fruits and Vegetables 2nd Edition; S. Ranganna.
- Manual of Methods of Analysis of Foods (Fruit and Vegetable Products), FSSAI, 2016
- Nutritive Value of Indian Food; Dr. C. Gopalan NIN Hyderabad
- UNIDO Technology Manual, Small-scale Fruit and Vegetable, Processing and Products,

<b>Internal Evaluation for VSC</b>	
Attendance	10 Marks
Practical performance	20 Marks
MCQ/ Viva	10 Marks
Practical Record book	10 Marks
<b>Total</b>	<b>50 Marks</b>

<b>116210 SEC Lab/Practical 7 : : Basic Skills in Food Processing</b>							
<b>Level</b>	<b>Semester</b>	<b>Course code</b>	<b>Course Name</b>	<b>Credits</b>	<b>Teaching Hours</b>	<b>Exam Duration</b>	<b>Maximum marks</b>
4.5	II	116210	SEC : Basic Skills in Food Processing	2	60	2Hrs	50

### **Course Objectives**

- To train the students in basic skills of using the equipment in the Food Science laboratory
- To impart the skill of application of various preliminary operations for the basic processing
- To educate the students about the applications of basic concepts in diet planning
- To train the students to apply the knowledge to compare the properties of food
- To impart the skill of use of a Brix meter to determine the total soluble solids

**Cos:** Upon completion of this course successfully, students will be able to

- Do focus on all the above objectives
- Identify the oils by their properties
- Apply methods like blanching, fermentation, etc. for food processing
- Determine and compare the physical properties of food
- Handle the pH meter and Brix meter

### **List of practical**

1. Preparation of solutions for the determination of acid/ saponification value
2. Comparison of densities of different food samples
3. Comparison of acidity of different food samples
4. Comparison of gluten in different flour samples
5. Comparison of 1000 grain weight of different kinds of grains
6. Carry out blanching of different fruits and vegetables
7. Carry out fermentation of various milk samples
8. Comparison of different milk samples according to the quality parameter
9. Whipping of egg
10. Preparation of various spices
11. Study of juice extraction yield of various fruits
12. Coagulation of protein by different methods

### 13. Comparison of specific gravity of different liquid food

#### References

- Asian Manual of Food Analysis, Institute of Nutrition, Mahidol University, Asean Foods, 2011
- Encyclopedia of Foods – A Guide to Healthy Nutrition, Academic Press-An Imprint of Elsevier, San Diego, California
- Handbook of Analysis and Quality Control for Fruits and Vegetables 2nd Edition; S. Ranganna.
- Manual of Methods of Analysis of Foods (Fruit and Vegetable Products), FSSAI, 2016
- Nutritive Value of Indian Food; Dr. C. Gopalan NIN Hyderabad
- UNIDO Technology Manual, Small-scale Fruit and Vegetable, Processing and Products, 2004

#### Internal Evaluation for SEC

Attendance	10 Marks
Practical performance	20 Marks
MCQ/ Viva	10 Marks
Practical Record book	10 Marks
<b>Total</b>	<b>50 Marks</b>