

# Sanjay Ghodawat University, Kolhapur

## School of Allied Health Sciences

### B. Sc. Food Science and Technology (3 years program)

	Courses					Credits
Year: 1 Sem. I	UFT101 General Biology (T-3, P-1)	UFT102 General Chemistry (T-3, P-1)	UFT103 General Microbiology (T-2, P-2)	UFT104 Fundamentals of food Technology (T-2, P-2)	Univ. core Foreign Language	20
Year: 1 Sem. II	UFT201 Food Chemistry (T-2, P-2)	UFT202 Food Microbiology (T-2, P-2)	UFT203 Food & Nutrition (T-2, P-2)	UFT204 Food Processing Technology (T-2, P-2)	Univ. core English and Communication skills	20
Year: 2 Sem. III	UFT301 Food Analysis (T-2, P-2)	UFT302 Bakery Technology (T-2, P-2)	UFT303 Milk & Milk Product Technology (T-2, P-2)	UFT304 Fruits & Vegetables Technology (T-2, P-2)	Biomedical Waste (T-2, P-2)	20
Year: 2 Sem. IV	UFT401 Spices and Condiments Processing (T-2, P-2)	UFT402 Meat, Fish and Poultry Processing (T-2, P-2)	UFT403 Pulses & Oil seed Processing Technology (T-2, P-2)	UFT404 Food Laws & Regulation, Quality & Evaluation (T-2, P-2)	Univ. core Environmental Science (T-3, P-1)	20
Year: 3 Sem. V	UFT501 Processing of Confectionary Products (T-2, P-2)	UFT502 Food Additives (T-2, P-2)	UFT503 Technology of Beverages (T-2, P-2)	UFT504 Snack Food and Extrusion Technology (T-2, P-2)	Univ. core Employability Skills (T-3, P-1)	20
Year: 3 Sem. VI	UFT601 Food Packaging (T-3, P-1)	UFT602 Food Safety & Management (T-3, P-1)	UFT603 Project execution	UFT604 Internship		20

**Course Structure**  
**Third Year B. Sc. Food Science and Technology**  
**Semester V**

Subject Code	Subject Name	Teaching Scheme (Hours / Week)		Credit Assigned		
		L	P	Theory	Practical	Total
UFT501	Processing of Confectionary Products	2	4	2	2	4
UFT502	Food Additives	2	4	2	2	4
UFT503	Technology of Beverages	2	4	2	2	4
UFT504	Snack Food and Extrusion Technology	2	4	2	2	4
UMC004	Employability Skills - I	3	1	3	1	4
	<b>Total</b>	<b>10</b>	<b>20</b>	<b>10</b>	<b>10</b>	<b>20</b>

## DETAILED SYLLABUS

### SEMESTER: V

#### UFT501 Processing of Confectionery Products

Unit No	Content	Hours
Unit I	Importance of confectionery in food industry, Principle involved in confectionery products, Classification of confectionery, Types of Confectionery products, Characteristics of confectionery products	8
Unit II	Processing of cocoa beans, chocolate refining, conching and molding, enrobing, panning	8
Unit III	Sugar confectionery: Types of sugars, production, storage, alternative bulk sweeteners, corn syrup and glucose syrup, sorbitol, xylitol, maltitol, isomalt, lactitol, mannitol, polydextrose, Chewing gum and Bubble gum-Ingredients, functions ,manufacture	9
Unit IV	Boiled Sweets - Hard and soft boiled sugar confectionery: fondant, fudge, caramel, toffee, nut Brittles, Gelatin Sweets - Fruit chews, jellies, gums, Defects in confectionery: sugar bloom, Fat bloom	9

#### Reference Books:

1. Snack Food Processing, Edmud W. Lusas, Lloyd W. Rooney, CRC Press, 2001.
2. Chocolate, Cocoa and Confectionery: Science and Technology Bernard W. Minifie  
Industrial Chocolate Manufacture and Use S. T. Beckett

#### Practicals:

1. Preparation of fondant and its quality analysis.
2. Preparation of fudge and its quality analysis.
3. Preparation of jujubes candy and its quality analysis.
4. Preparation of toffee and its quality analysis.
5. Preparation of Chocolate its quality analysis.
6. To study the process of inversion, melting and caramelization in sucrose.
7. Determination of the effect of heat on sugar solution.
8. Preparation of Cocoa its quality analysis.
9. Preparation of brittles and its quality analysis.
10. Preparation of hard boiled candy and its quality analysis.

## UFT502 Food Additives

Unit No	Content	Hours
Unit I	Introduction to Food Additives, Scope, Functions and uses of Food Additives, Classification- Intentional and Unintentional Food additives, Toxicology and Safety Evaluation of Food Additives. Stabilizers, thickeners and Emulsifiers: Introduction; Types; Applications in food processing;	8
Unit II	Foods Acidulants: Introduction, Role in food processing, Natural and Synthetic food colorants, Classification of Food colorants, chemical nature, Pigments: Introduction, Classification, Utilization as food colour.	8
Unit III	Food Preservatives: Introduction, Classification, Role in Food processing, Antioxidants and Chelating agents: Introduction, Role in foods, Types of antioxidant, Chelating agents: Natural and synthetic Applications of antioxidants and chelating agents	9
Unit IV	Anti-caking agents and Humectants: Introduction, Different Anti-caking agents and Humectants, Role in food processing Starch modifiers: Introduction, Role in food processing. Antimicrobial agents, Clarifying agents, antifoaming agents, Fat mimetic and replacers- Introductions, Role in food processing	9

### Reference Books:

1. Fennema, O.R. Ed. 1976. Principles of Food Science: Part-I Food Chemistry. Marcel Dekker, New York.
2. Potter, N.N. 1978. Food Science. 3rd Ed. AVI, Westport
3. Furia, T.E. 1980. Handbook of food additives. Vol I and Vol II
4. George A.B, Encyclopedia of food color additives, Vol III; CRC Press

**Practicals:**

1. Estimation of adulterants in food sample.
2. Determination of carotenoids content in food sample.
3. Determination of chlorophyll content in food sample.
4. Estimation of tannins content in food sample.
5. Qualitative Tests for presence of benzoic acid in foods.
6. Determination of nitrates and nitrites in Foods.
7. Determination of diacetyl content in dairy products.
8. Detection of chemical preservatives in foods.
9. Study of effect of acidulants in fruit juices.
10. Study of effect of clarifying agents on the fruit juices.

## UFT503 Technology of Beverages

Unit No	Content	Hours
Unit I	Introduction of Beverages, Importance and status of beverage industry in India and in the world. Introduction and specification Packaged drinking water Classification of beverages.	8
Unit II	Introduction and specifications for synthetic, still, carbonated, low-calorie and dry beverages, isotonic and sports drinks, dairy based and alcoholic beverages, FSSAI specifications for beverages.	9
Unit III	Ingredients used in processing of beverages, Processing of beverages, juice based beverages, processing and packaging of different beverages, Equipments used for different beverages	8
Unit IV	Sweeteners, colorants, acidulants, clouding, clarifying and flavouring agents for beverages, Carbon dioxide and carbonation, Quality tests and control in beverages, Miscellaneous beverages: coconut water, sweet toddy, sugar cane juice, coconut milk, flavoured syrups	9

### Reference Books:

1. Foods Facts and Principles, Manay N. S., Shandakh, 2008.
2. Food Science, Potter N. N., Hotchkiss, J. H., CBS Publishers, 5th edition, 2007.
3. Food Science, Srilakshmi B., New Age International Private Ltd Publishers, 7th edition, 2018.
4. Technology of Bottled Water, Nicholas Dege, Wiley-Blackwell Publishing Ltd, 3rd edition, 2011.

**Practicals:**

1. Quality analysis of water.
2. Determination of hardness of water and beverages.
3. Determination of brix value, pH and acidity of beverages.
4. Preparation of synthetic beverage.
5. Determination of colors in soft drinks by wool technique.
6. Preparation of iced and flavored tea.
7. Preparation of instant tea.
8. Preparation of carbonated beverages.
9. Preparation of non-carbonated beverages.
10. Preparation of sports drink.

## UFT504 Snack Food and Extrusion Technology

Unit No	Content	Hours
<b>Unit I</b>	Introduction to snacks, Domestic and Global status of Snack Food Industry, Ingredients & additives commonly used in snack food, their attributes and functions. Starches for snack foods, Technology for grain-based snacks: whole grains, roasted, toasted, puffed, popped and flakes, coated grains-salted, spiced and sweetened; flour based: batter and dough based products papads.	<b>8</b>
<b>Unit II</b>	Potato Chips, Meat based snacks, Snacks based on popcorn, baked snacks, Nut based snacks (salted, spiced and sweetened), Savory and Farsans, Processing of Papad, Chips and Wafers, Corn Chips and Simulated Potato Chips, Application of seasonings, Indian Savory Sweets	<b>8</b>
<b>Unit III</b>	Extrusion: Introduction to extrusion and extruders, principles and types, Extruded products, Extruding Equipment, Uses of extruders in the snack food industry; Specialized Equipment for Popcorn Processing; Snack foods from formers & high shear extruders, Potato chip processing, Equipment for Frying, Baking, and Drying, Snack foods from cooking extruders	<b>9</b>
<b>Unit IV</b>	Product protection and packaging materials: Quality properties of snack foods, properties of snack food packaging materials, Packaging Materials and Packaging equipment's required for snack foods. Quality assurance and Quality control of snack foods: evaluation methods-process control and product attributes and safety, Oil Content and Shelf Stability.	<b>9</b>

### Reference Books:

1. Matza S, Extruded foods. Springer, 2000
2. N.D. Frame, Technology of Extrusion Cooking Springer, (Springer New York, NY 2012) 1-51
3. Riaz M.N., Extruders in Food Application CRC Press, 2000
4. Samuel A. Matz, Snack food technology 3rd edition AVI Publ.1993
5. Maskan and Altan Advances in Food Extrusion Technology CRC Press, 2000



6. Edmund W. Lusas and Lloyd W. Rooney, Snack Foods Processing CRC Press 2000.

**Practicals:**

Preparation of Papad and its quality evaluation.

Preparation of Chips and its quality evaluation.

Preparation of Flaked cereals(Poha) and its quality evaluation.

Preparation of Puffed cereals and its quality evaluation.

Preparation of Roasted grains or nuts and its quality evaluation.

Preparation of instant food premixes and its quality evaluation.

Preparation of extruded snack food and its quality evaluation.

Preparation of popcorn and its quality evaluation.

## Second Year B. Sc. Food Science and Technology

### Semester VI

Subject Code	Subject Name	Teaching Scheme (Hours / Week)		Credit Assigned		
		L	P	Theory	Practical	Total
UFT601	Food Packaging	3	2	3	1	4
UFT602	Food Safety and Management	3	2	3	1	4
UFT603	Project execution		4			4
UFT604	Internship		8			8
	<b>Total</b>	<b>10</b>	<b>20</b>	<b>10</b>	<b>10</b>	<b>20</b>

## DETAILED SYLLABUS OF SEMESTER: VI

### UFT601 Food Packaging

Unit No	Content	Hours
Unit I	Introduction to packaging situations in world and India, need of packaging, plastic consumption, use in world, India etc. package requirements, package functions, hazards acting on package during transportation, storage and atmospheric package, labeling laws	10
Unit II	Package materials: classification packages, paper manufacturing, types, advantages, corrugated and paper board boxes etc. Glass manufacturing, advantages, disadvantages, metal manufacturing, advantages, disadvantages, plastic as package material, properties, uses and chemistry of each plastic such.	12
Unit III	Lamination, Coating and Aseptic packaging: Lamination, need of lamination, types, properties, advantages & disadvantages of each type. coating on paper & films, types of coatings, need of coating, methods of coatings, Biodegradable and edible packaging, aseptic packaging-need, advantages, process	12
Unit IV	Packaging of specific foods with its properties like bread, biscuits coffee, milk powder, carbonated beverages snack foods etc., Mechanical and functional tests on package, various mechanical functional testes perform in laboratories on package boxes and package materials	12

#### Reference Books:

1. Paine, Frank A., and Heather Y. Paine. *A handbook of food packaging*. Springer Science & Business Media, 2012.
2. Coles, Richard, Derek McDowell, and Mark J. Kirwan, eds. *Food packaging technology*. Vol. 5. CRC press, 2003.
3. Sacharow, Stanley, and Roger C. Griffin. *Principles of food packaging*. AVI Pub. Co., 1980.
4. Kadoya, Takashi, ed. *Food packaging*. Academic Press, 2012.
5. Mahadeviah, M., and R. V. Gowramma. *Food packaging materials*. Tata McGraw-Hill, 1996.
6. Palling, S. J. *Developments in food packaging*. No. 664.09 P3. 1980.

**Practicals:**

Identification of packaging materials

Measurement of thickness of packaging films, papers and boards

Measurement of water absorption of paper, paper boards

To determine GSM (gram per square meter) of paper and paper board

Measurement of bursting strength of paper of paper boards

Measurement tears resistance of papers

Measurement of tensile strength of paper of paper boards

Determination of gas transmission rate of package films

Determination of WVTR of films

Prepackaging practices followed for packing of fruits and vegetables

Visit to packaging industry

## UFT602 Food Safety and Management

Unit No	Content	Hours
Unit I	Hazards in food chain: physical, chemical and biological, Toxins in food-naturally occurring, bacterial and fungal, Pesticide residues as toxin: Chlorinated and non-chlorinated	10
Unit II	concept of Food Safety Management Tools: Prerequisites- GHPs, GMPs, HACCP- Principles, Pre requisites case studies	12
Unit III	ISO concept and need ,case studies series, TQM: concept and need for quality , Risk Analysis Accreditation and Auditing Sanitation-Principles and Design Chemicals and Pest management	12
Unit IV	Rules and Regulations of Food Safety, Introduction: Authorities and Officers, Constitution, Functions and Powers –General Provisions as to Articles of Food Indian Food Regulatory, Global Scenario, Other laws and standards related to food	12

### Reference Books:

1. Sensory Evaluation Technique, Civillie and Carr, CRC Press, 2015.
2. Handbook of Food Toxicology, Deshpande S. CRC Press, Woodhead Publishing, Cambridge, 2002
3. Food Toxicology, Helferich William and Winter Carl K, CRC Press, CRC Woodhead Publishing Ltd., Cambridge 2000.
4. Food Additives: Characteristics, Detection and Estimation Mahindru S.N., Tata McGraw Hill, New Delhi. .2000
5. Food Standards and Safety in a Globalised World: The Impact of WTO and Codex, Saxena Madhu and Khanna Sri Ram, New century Publications, New Delhi.2003.

**Practicals:**

1. Estimation of Salmonella / Shigella / Staphylococcus from food samples.
2. Estimation of fungal toxins from different foods.
3. Detection of Salmonella.
4. Detection of Staphylococcus aureus.
5. HACCP for food industries by taking few models.
6. Study of National and Codex microbial quality standards.
7. Visit to food industry to study microbial safety.