P. D. E. A's
Prof. Ramkrishna More Arts, Commerce and Science
College Akurdi Pune-411044

Affiliated to

Savitribai Phule Pune University [SPPU]

Food Science & Technology

Choice Based Credit System [CBCS]
Autonomy and NEP-2020
Under

From Academic Year 2023-2024

Syllabus

First Year Graduate (F.Y. B. Voc)
Food Science & Technology

Board of Studies Food Science & Technology

P. D. E. A's.

Prof. Ramkrishna More College, Akurdi, Pune 411044

Graduate Degree Course Framework under Autonomy as per NEP-2020

With Major Food Science & Technology

Sem.	Major Courses	Major Elective Curses	Minor Curses	VSC	IKS	FP/OJT/CEP	GE/OE	SEC	AEC	VEC	CC	Total Credits
First Year Certificate Course												
I	FSTMAT 111 FSTMAT 112 FSTMAP 113	0	0	FSTVST-114	FSTIKT-115	0	1 theory + 1 Practical From Basket	1 theory/ practical From Basket	Marathi/Hindi	Environment Awareness	2 Credit From Basket	22
II	FSTMAT 121 FSTMAT 122 FSTMAP 123	0	1 Theory Other than Food Science	FSTVSP-124	0	0	1 theory + 1 Practical From Basket	1 theory/ practical From Basket	English	1 theory From Basket	2 Credit From Basket	22
Second Year Graduate Diploma												
III	FSTMAT 231 FSTMAT 232 FSTMAT 233 FSTMAP 234	0	1 Theory + 1 Practical Other than Food Science	FSTVST-235	0	Field Project (2 Credit)	1 theory From Basket	0	English		2 Credit From Basket	22
IV	FSTMAT 241 FSTMAT 242 FSTMAT 243 FSTMAP 244	0	1 Theory + 1 Practical Other than Food Science	0	0	Community Engagement and Service (2 Credit)	1 Practical From Basket	1 theory/ practical From Basket	Marathi/Hindi		2 Credit From Basket	22
Third Year Graduate Degree												
V	FSTMAT 351 FSTMAT 352 FSTMAT 353 FSTMAP 354 FSTMAP 355	FSTMAT 356 A FSTMAP 357 A Or FSTMAT 356 B FSTMAP 357 B	1 Theory + 1 Practical Other than food science	FSTVSP-358	0	Field Project (2 Credit)	0	0	0	0	0	22
VI	FSTMAT 361 FSTMAT 362 FSTMAT 363 FSTMAP 364 FSTMAP 365	FSTMAT 366 A FSTMAP 367 A Or FSTMAT 366 B FSTMAP 367 B	1 Theory + 1 Practical Other than food science	0	0	OJT (4 Credit)	0	0	0	0	0	22

Codes, Generic name and Title of the paper

Major Courses Food science			
Semester	**Course code**	**Generic Name**	**Title of the paper**
I	FSTMAT 111	Food Sci & Tech theory paper-1	Introduction To Food Science
	FSTMAT 112	Food Sci & Tech theory paper-2	Food Chemistry
	FSTMAP 113	Food Sci & Tech practical paper-1	Practical's On Food Science
II	FSTMAT 121	Food Sci & Tech theory paper-3	Food Microbiology
	FSTMAT 122	Food Sci & Tech theory paper-4	Basic Nutrition
	FSTMAP 123	Food Sci & Tech practical paper-2	Practical On Food Microbiology
III	FSTMAT 231	Food Sci & Tech theory paper-5	Techniques In Food Analysis
	FSTMAT 232	Food Sci & Tech theory paper-6	Food Packaging
	FSTMAT 233	Food Sci & Tech theory paper-7	Dairy Technology
	FSTMAP 234	Food Sci & Tech practical paper-3	Practical's On Dairy Technology
IV	FSTMAT 241	Food Sci & Tech theory paper-8	Food Biochemistry
	FSTMAT 242	Food Sci & Tech theory paper-9	Technology Of Baked Products
	FSTMAT 243	Food Sci & Tech theory paper-10	Food Engineering
	FSTMAP 244	Food Sci & Tech practical paper-4	Practical's On Bakery
V	FSTMAT 351	Food Sci & Tech theory paper-11	Fruit And Vegetable Technology
	FSTMAT 352	Food Sci & Tech theory paper-12	Nutraceutical And Health Foods
	FSTMAT 353	Food Sci & Tech theory paper-13	Animal Technology
	FSTMAP 354	Food Sci & Tech practical paper-5	Practical's On Fruit And Vegetable Technology
	FSTMAP 355	Food Sci & Tech practical paper-6	Practical's On Clinical And Therapeutic Nutrition
VI	FSTMAT 361	Food Sci & Tech theory paper-14	Food Quality Control
	FSTMAT 362	Food Sci & Tech theory paper-15	Cereal, Legume And Oilseed Technology
	FSTMAT 363	Food Sci & Tech theory paper-16	Food Preservation
	FSTMAP 364	Food Sci & Tech practical paper-7	Practical On Food Preservation
	FSTMAP 365	Food Sci & Tech practical paper-8	Practical On Food Analysis
Major Elective Food science			
V	FSTMAET-356 A	Elective Food Science theory paper1-A	Sports Nutrition
	FSTMAET-356 B	Elective Food Science theory paper1-B	Community Nutrition
	FSTMAEP-357 A	Elective Food Science Practical paper1-A	Practical On Sports Nutrition
	FSTMAEP-357 B	Elective Food Science theory paper1-B	Practical On Community Nutrition
VI	FSTMAET-366 A	Elective Food Science theory paper1-A	Technology Of Beverage
	FSTMAET-366 B	Elective Food Science theory paper1-B	Advanced Bakery Technology
	FSTMAEP-367 A	Elective Food Science Practical paper1-A	Practical On Beverage Processing
	FSTMAEP-367 B	Elective Food Science theory paper1-B	Practical On Advanced Bakery Technology
Vocational Skill Courses (VSC) Related to Major Food science			
I	FSTVST-111	Vocational Food Sci & Tech theory-I	Food Hygiene And Sanitation
II	FSTVSP-121	Vocational Food Sci & Tech Practical-I	Practical's On Sensory Analysis And Adulteration

III	FSTVST-231	Vocational Food Sci & Tech theory-II	Food Adulteration
IV	---	---	---
V	FSTVSP-351	Vocational Food Sci Practical-II	Practical On Utilization Of Food Waste In Value Added New Food Products
Minor Food science			
I	-------	--------	---------
II	FSTMIT-121	Minor Food Sci & Tech Theory-1	Food Fermentation Technology
III	FSTMIT-231	Minor Food Sci & Tech Theory-2	Food Analysis
	FSTMIT-231	Minor Food Sci & Tech Practical-1	Practical On Food Analysis
IV	FSTMIT-241	Minor Food Sci & Tech Theory-3	Tomato Production And Processing
	FSTMIT-241	Minor Food Sci & Tech Practical-2	Practical On Tomato Products
V	FSTMIT-351	Minor Food Sci & Tech Theory-4	Meat And Poultry Technology
	FSTMIT-352	Minor Food Sci & Tech Practical-3	Practical On Meat And Poultry Technology
VI	FSTMIT- 361	Minor Food Sci & Tech Theory-5	Basics Of Food Microbiology
	FSTMIT- 362	Minor Food Sci & Tech Practical-4	Practical On Food Microbiology
IKS Related to Food science Major			
I	FSTIKT-111	Indian knowledge system Food Sci & Tech paper	Ayurveda And Nutrition
SEC for science faculty students from Food science discipline			
I	FSTSET-111	Skill Food Sci & Tech Theory-I	Processing Of Dehydrated Products.
II	FSTSET- 121	Skill Food Sci & Tech Theory-II	Processing Of Frozen Foods
III	------	-----	------
IV	FSTSET- 241	Skill Food Sci & Tech Theory -III	Confectionery Processing

GE/OE for science faculty students from Food Science discipline			
I	FSTGET-111	General elective Food Sci & Tech Theory-I	Food Adulteration.
I	FSTGEP- 112	General elective Food Sci & Tech Practical-I	Practical on Food Adulteration
II	FSTGET-121	General elective Food Sci & Tech Theory-II	Public Health Nutrition.
II	FSTGEP- 122	General elective Food Sci & Tech Practical-II	Practical on Public Health Nutrition.

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F. Y. B. Voc Food Science Syllabus

CBCS Semester Pattern

Under Autonomy and NEP-2020

To Be Implemented From

Academic Year 2023-2024

FSTMAT 111, Food Sci & Tech Theory paper-1,
Introduction to Food Science

Note: Each lecture is of 1 hour

Module-1 **[12L+3T]**

Chapter-1: Introduction of Food Science **[6 L]**

- Introduction & Definition of Food Science;
- Factors Affecting Food Consumption and Taste
- Energy Requirement in Human Body,
- Five Food Groups and Food Guide,
- Functions of Food,
- Classification of Food
- Intermediate moisture foods.

Chapter-2: Properties of food & Preservation **[6 L]**

- Physical Properties - Solution, Vapour Pressure, Boiling Point, Freezing Point, Osmotic Pressure, Viscosity, Specific Gravity, Colloids- Sols, Gels, Emulsion, aerosols.
- Acids, Base & Buffers
- Food Fortification, Composition and Related Quality Factors for Processing.
- Concept of Preservation, its Principles, Methods.

Module-2 **[12L+3T]**

Chapter-3: Cooking of Foods **[4L]**

- Methods of cooking -conduction, convection, radiation, microwave
- Cooking media-air, water, steam, fat
- Solar cooking
- Changes in cooking- protein, carbohydrates, lipids, vitamins, minerals, colour.

Chapter-4: Texture **[4 L]**

- Introduction, definition and importance of texture
- Texture perception, receptors involved in texture perception
- Rheology of foods.
- Texture classification
- Application of texture measurement in cereals, fruits and vegetables, dairy, meat and meat products.

Chapter-5: Olfaction **[4 L]**

- Introduction, definition and importance of odour and flavor
- Mechanism of odour perception
- Theories of odour classification, chemical specificity of odour.
- Emphasis on recent techniques- e- nose etc.
- Olfactory abnormalities

Reference-:

1. Potter, N. N. And Joseph, H. Hotchkiss, "Food Science", CBS Publishers and Distributors, New, Delhi, 1996.

2 Foods: Facts and Principles - N Shakuntala manay M Shadakshara Swamy

3. Food Science - B Srilakshmi

Course Outcome at the end of course, student will able -

CO1.Students will understand the basic concepts in food science and will get knowledge of the different food preparation methods.

CO2: Define the terms related to Food Science, functions of food, structure, composition of cereals, pulses and food groups.

CO3: Describe food groups, specific cereals and summarize different types of pulses in relation to health.

CO4: Quote different cooking methods like dry heat and moist heat.

CO5: Prepare food by using different cooking methods.

CO6: Apply the principles of food science to control and assure the quality of food products.

FSTMAT 112, Food Sci & Tech Theory paper-2,
Food Chemistry

Note: Each lecture is of 1 hour

Module-1 **[12L+3T]**

Chapter-1: Water **[6 L]**

- Introduction & Definition of Food chemistry
- Water and water activity
- Definition of water in food
- Structure of water and ice
- Types of water
- Sorption phenomenon
- Water activity and packaging
- Water activity and shelf-life

Chapter-2: Lipids **[6 L]**

- Classification of lipids
- Physical properties-melting point, softening point, specific gravity, refractive index, smoke, flash and fire point, turbidity point.
- Chemical properties-, iodine value, peroxide value, saponification value.
- Effect of frying on fats
- Changes in fats and oils- rancidity, lipolysis, flavor reversion
- Auto-oxidation and its prevention
- Technology of edible fats and oils- Refining, Hydrogenation and Interesterification, Fat mimetics

Module-2 **[12L+3T]**

Chapter-3: Proteins **[4L]**

- Introduction to Proteins
- Protein classification and structure
- Nature of food proteins
- Properties of proteins- denaturation
- Functional properties of proteins eg. organoleptic, solubility, viscosity, binding gelation/texturization, emulsification, foaming

Chapter-4: Carbohydrates **[4L]**

- Introduction to Carbohydrates

Classification (mono, Di, oligo and poly saccharides)
• Structure of important polysaccharides (starch, glycogen, cellulose, pectin, hemicellulose, gums, dietary fibres)
• Chemical reactions of carbohydrates –oxidation, reduction, with acid & alkali
• Modified celluloses and starches
• Enzymatic browning
• Non – Enzymatic browning - Maillard reaction, Caramelization reaction, Dextrinization

Chapter-5: Flavour & Colours **[4 L]**

• Definition and basic tastes
• Chemical structure and taste
• Description and classification of food flavours
• Flavour enhancers
• Introduction to Food colours
• Importance of food colours
•Classification of food colours

REFERENCES BOOKS

1. Principles of Food Chemistry, by John M. DeMan, Publication Springer Science & Business Media
2. Food Chemistry Third Edition, by Owen R. Fennema, University of WisconsinMadison Madison, Wisconsin

Course Outcome at the end of course, student will able -

CO1: Define the basic concepts of Food Chemistry.

CO2: **E**xplain chemical changes of carbohydrates, protein and fat after processing

CO3: Classify Chemical changes in Carbohydrates.

CO4: Determine the types of water in food.

CO5: Calculate the physical properties of Lipids

CO6: **L**ist the flavours & colours in foods.

FSTVST 111, Vocational Food Sci & Tech Theory Paper-I,
Food Hygiene and Sanitation

Note: Each lecture is of 1 hour

Module-1 **[12L+3T]**

Chapter-1: Introduction to Food Sanitation and Hygiene **[6 L]**

- Introduction & Definition
- Overview Sanitary Regulations: GMPs, GHP
- Standards: ISO 9000, ISO 14000

Chapter-2: Importance of HACCP **[6 L]**

- Introduction to Hazard Analysis and Critical Control Points (HACCP)
- Terms and Definitions of HACCP
- HACCP Importance in hygiene and sanitation
- Application of HACCP in Food Industry

Module-2 **[12L+3T]**

Chapter-3: Types of sanitation **[4 L]**

- Introduction & Definition of Sanitation
- Personal Hygiene;
- Cleaning, Sanitizing
- Air Sanitation;
- Equipment Sanitation
- Water Sanitation,
- Equipment for Effective Sanitation,
- Waste Product Disposal,

Chapter-4: Post processing sanitation **[4 L]**

- Pest Control;
- Packaging Sanitation
- Food Storage Sanitation;
- Food Transport Sanitation.

Chapter-5: Sanitation and Contamination **[4 L]**

- Introduction & Definition of Sanitation and Contamination
- Food Contamination Sources
- Microorganisms and Their Relationship to Sanitation
- Method of cleaning and disinfection.
- Types of Detergents and Sanitizer & its contamination.

REFERENCES BOOKS

- Food Poisoning and Food Hygiene. London: Arnold, 1998. Hobbs, Betty C. and Roberts, Diane
- Food Hygiene, Health and Safety. London: Longman, 1998. Stretch, A and Southgate, H.

Course Outcome at the end of course, student will able -

CO1 Explain the concept/idea of food safety to other food handlers/employees/customers

CO2 Discuss the types of hazards involved in food preparation

CO3 Identify the challenges to food safety in their particular kind of food business operation

CO4 Identify the factors that influence the growth of micro-organisms

CO5 Illustrate by simulation/role-play, selected conditions that are associated with hazards in handling food.

CO6 Explain what is meant by the “temperature danger zone” in food safety

FSTIKT 111, Indian Knowledge System Food Sci & Tech Theory paper, Ayurveda & Nutrition

Note: Each lecture is of 1 hour

Module-1 **[12L+3T]**

Chapter-1: Introduction to Ayurvedic Nutrition **[4 L]**

- Ayurveda and Indian food cultures
- Nutrition and lifestyle transition over the years
- Regional Food Traditions of India

Chapter-2: Basic principles of Food and Nutrition and Ayurveda **[6 L]**

- Understanding rich sources of nutrients
- Concept of Doshas & assessment
- Ayurvedic Principles of food habits and factors determining quality of food (Ahara vidhi visheshaayatana)
- FSSAI regulations on Ayurvedic Aahar

Module-2 **[12L+3T]**

Chapter-3: Ayurvedic Ahara and Seasonal Diets **[6 L]**

- Principles of Diet: Aharavidhi vidhan, Sattvic, Rajasi, Tamasic foods
- Incompatible food (Viruddha Ahara), Pathya; Apathya; Viprita Ahaar
- General concept of Diet according to the Seasons
- Importance of diet according to various seasons
- Diet according to Ritu

Chapter-4: Ayurvedic Lifestyle management **[4 L]**

- Lifestyle Management with Dincharya and Ritucharya
- Application of Ayurvedic diets to stress linked food behaviour

Chapter-5: Ayurvedic Nutrition in Lifestyle disorders **[4 L]**

- Ayurvedic nutrition in different diseases
- PCOD, PCOS, Type II Diabetes, Hypertension,
- Atherosclerosis, Heart diseases and stroke,
- Obesity, Respiratory Ailments, Cancer

REFERENCES BOOKS

- Sushruta Samhita Author name: Maharisi Susruta, Edited: Kaviraja Ambikadutta Shastri, Chaukumba Sanskrit Samsthan, Varanasi.
- Digestion and metabolism – Dr. C. Dwarikanath

Course Outcome at the end of course, student will able -

CO 1 Describe the essential element of vision and mission of dept by imparting quality education of traditional Indian food science. -

CO2 Explain the knowledge of history of Indian diet and nutrition.

CO3 Identify Ayurveda and its principles.

CO4 Elaborate effect of diet in physiological processes.

CO5 Understand the constitution of an individual in all aspects.

CO6 Illustrate Ayurvedic aspect of physiology for further diet panning

FSTSET 111, Skill Food Sci & Tech Theory paper,
Processing of Dehydrated Products

Note: Each lecture is of 1 hour

Module-1 **[12L+3T]**

Chapter-1: Introduction **[6 L]**

- Definition & introduction to Dehydration
- Purpose of Drying of Foods

- Principles of Preservation & Drying
- Pre-treatment affecting Drying/ Dehydration

Chapter-2: Principles of Drying **[6 L]**

- Mechanism & Phases of Drying
- Drying using heated air
- Drying using heated surfaces

Module-2 **[12L+3T]**

Chapter-3: Equipment's in Dehydrated products **[4 L]**

- Hot air dryers
- Contact Dryers
- Tunnel Dryer
- Spray Dryer
- Solar Dryer
- Fluidised Bed Dryer
- Freeze Dryer
- Drum Dryer
- Vacuum Drying
-

Chapter-4: Effects of Drying on Food **[4 L]**

- Taste & Texture
- Flavour & Aroma
- Colour
- Nutritional Value

Chapter-5: Rehydration of Dehydrated Products **[4 L]**

- Post Drying Treatment
- Rehydration/ Reconstitution
- Packaging & Storage

REFERENCES BOOKS

- Food Processing Technology: Principles and Practice (Woodhead Publishing Series in Food Science, Technology and Nutrition). by P J Fellows
- Fruit and Vegetable Preservation Principles BY R.P Srivastava, Sanjeev Kumar

Course Outcome at the end of course, student will able -

CO1 Illustrate the underlying concepts of various methods of food dehydration
CO2 Outline the basis for extension of storage life of foods by dehydration
CO3 Compare and contrast methods for dehydrating different foods, and the consequences in terms of food quality
CO4 Explain factors affecting the rate of dehydration
CO5 Describe the packaging requirements for foods dehydrated by various dehydration methods.

CO6 Explain the spoilage and deterioration mechanisms in foods and methods to control deterioration and spoilage.

FSTMAP 113, Food Sci & Tech Practical Paper-1,
Food Science

Sr. No.	Content	No. of Hours
1	Weights and measures used in cooking	4
2	Determination of Gluten content in wheat	4
3	To study different cuts in fruits and vegetables	4
4	To study Cooking Quality of Pulses	4
5	To study effect of enzymatic browning on different fruits and vegetables	4
6	To study the blanching process & adequacy of blanching	4
7	To study to boiling points of different liquid foods	4
8	To study the specific gravity of different liquid foods	4
9	To study different methods of cooking and its effect on foods	4
10	To study the effect of roasting on nuts and oilseeds.	4
11	To study the texture of different solid foods	4
12	Demonstration of food emulsion	4
13	Study the Sprouting of Different Pulses	4

14	Effect of Kneading on Gluten development	4
15	Parboiling of Paddy	4
16	Extraction of Soymilk & its utilization in Tofu Preparation	4

REFERENCES BOOKS

- Principles of Food Science: A Practical Manual by Eram S Rao
- Food Science: Experiments and Applications 2nd Edition 2019 By Mohini Sethi

Course Outcome at the end of course, student will able -

CO1: Recognize methods of Cooking.

CO2: Illustrate the types and parts of the equipment used in cooking methods.

CO3: Uses and Industrial applications of Blanching &Browning

CO4: Categorize the foods into different food groups according to their nutritional value.

CO5: Demonstration of cooking quality of different cereals and pulses.

FSTMAT 121, Food Sci & Tech Theory paper-3,
Food Microbiology

Note: Each lecture is of 1 hour

Module-1 **[12L+3T]**

Chapter-1: Introduction to Food Microbiology **[6 L]**

- History and Development of Food Microbiology
- Definition and Scope of food microbiology
- Inter-relationship of microbiology with other sciences
- Types of microorganisms associated with food, their morphology and structure (Virus, Bacteria, fungus)

Chapter-2: Microbial Growth in Food **[6 L]**

- Bacterial growth curve and microbial growth in food
- Factors affecting the growth of microorganisms in food
- Sources of Microrganisms in foods

Module-2 **[12L+3T]**

Chapter-3: Food Fermentations **[4 L]**

- Fermentation –definition and types
- Microorganisms used in food fermentations
- Dairy Fermentations-starter cultures and their types, concept of probiotics

Chapter-4: Microbial Food Spoilage **[4 L]**

- Some important food spoilage microorganisms
- Spoilage of specific food groups-
- Milk and dairy products,
- Meat, poultry and seafood's,
- Cereal and cereal products,

- Fruits and vegetables and Canned products

Chapter-5: Foodborne Diseases & Trends in Food Microbiology **[4 L]**

- Types – foodborne infections, foodborne intoxications and Toxic infections
- Common and Recent Examples
- Rapid Methods of Detection
- Recent Advances

REFERENCES BOOKS

1) Frazier William C and Westhoff, Dennis C. Food Microbiology, TMH, New Delhi, 2004

2) Jay, James M. Modern Food Microbiology, CBS Publication, New Delhi, 2000

Course Outcome at the end of course, student will able -

CO1: Define the basic concepts of Microbiology I.e. Bacteria, Viruses, Fungi.

CO2: Explain the discoveries and inventions of various microbiologists.

CO3: Classify different Microorganism on the basis of Temperature, i.e. Mesophilic, Thermophilic, thermoduric.

CO4: Determine the role of microorganisms in food processing,

CO5: Describe the types of Food borne illness

CO6: Explain the types of microbial spoilage in Industry

FSTMAT 122, Food Sci & Tech Theory paper-4,

Basic Nutrition

Note: Each lecture is of 1 hour

Module-1 **[12L+3T]**

Chapter-1: Introduction to Food and Nutrition **[6 L]**

- Basic terms used in study of food and nutrition,
- BMI, BMR, RDA, and Nutritional Status,
- Understanding relationship between food, nutrition and health

Chapter-2: Balanced Diet **[6 L]**

- Functions of food-physiological, psychological and social,
- Concept of Balanced Diet,
- Food Groups,
- Food Pyramid
- Food Plate

Module-2 **[12L+3T]**

Chapter-3: Macronutrients **[4 L]**

- Energy, Carbohydrates, lipids and proteins
- Classification,
- Digestion, functions, dietary sources,
- RDA, clinical manifestations of deficiency and excess and factors affecting absorption

Chapter-4: Micronutrients **[4 L]**

- Fat soluble vitamins-A, D, E and K
- Water soluble vitamins – thiamine, riboflavin, niacin, pyridoxine, folate, vitamin B12 and vitamin C
- Minerals – calcium, iron, iodine, sodium, sulphur, phosphorus, fluorine, magnesium, manganese, selenium, chromium, copper, chloride and zinc

Chapter-5: Water **[4 L]**

- Introduction to water
- Function of water
- Water balance
- Dehydration in human Body

REFERENCES BOOKS

- Handbook of Food and Nutrition Paperback by Dr. M. Swaminathan
- Krause's Food & the Nutrition Care Process, January 2012, Edition: 13th, Publisher: Elsevier

Course Outcome at the end of course, student will able -

CO1: Define the basic concepts of nutrition.

CO2: Explain how carbohydrates, protein and fat digestion take place in our body.

CO3: Classify different food groups on the basis of nutrients present in foods.

CO4: Determine the energy values of foods using calorimetry.

CO5: Calculate BMR and analyse nutritional status of a person.

CO6: List sources and requirement of carbohydrates, proteins, fats, vitamins and minerals for human being.

FSTMIT 121, Minor Food Sci & Tech Theory Paper-1,
Food Fermentation Technology

Note: Each lecture is of 1 hour

Module-1 **[12L+3T]**

Chapter-1: Introduction to Food Fermentation **[6 L]**

- Introduction
- History of Food Fermentation
- Fermented Food: Past, Present and Future

Chapter-2: Microorganisms involved in Food Fermentations **[6 L]**

- Fermentation –definition and types
- Microorganisms used in food fermentations

Module-2 **[12L+3T]**

Chapter-3: Fermentation of Alcoholic Beverages - **[4 L]**

- Malt beverages
- Distilled liquors
- Wines

Chapter-4: Oriental fermented foods - **[4 L]**

- Kefir,
- Sauerkraut
- Kombucha,

- Yoghurt, Miso,
- Kimchi,
- Tempeh,
- Soy sauce,
- Idli, Minchin,
- Soybean Cheese, Natto,
- Fermentation of Vinegar- history, introduction, process, types, defects and diseases

Chapter-5: Fermentation of animal Products- **[4 L]**

- Classification
- Ingredients
- Processing
- Dry Semidry Sausage,
- Salami, Fermented Fish
- Preserved Egg.

REFERENCES BOOKS

1) Frazier William C and Westhoff, Dennis C. Food Microbiology, TMH, New Delhi, 2004

2) Jay, James M. Modern Food Microbiology, CBS Publication, New Delhi, 2000

Course Outcome at the end of course, student will able -

CO1: Define the basic concepts of Food Fermentations.

CO2: Explain the discoveries and inventions of various fermented Foods

CO3: Classify different Microbial Cultures in fermented Foods

CO4: Determine the role of microorganisms in food fermentation

CO5: Describe the types of Oriental Fermented Foods

CO6: Explain the types of microbial spoilage in fermented Foods

FSTSET 121, Skill Food Sci & Tech Theory Paper-II, Processing of Frozen Foods

Note: Each lecture is of 1 hour

Module-1 **[10L+3T]**

Chapter-1: Introduction to Freezing **[4 L]**

- Definition,
- History
- Introduction
- Refrigeration Cycle, Cold Storage, types of Cold Storage

Chapter-2: Freezing: Principle **[6 L]**

- Principle
- Process of freezing
- Advantage
- Disadvantage
- Effect of Freezing on Foods

Module-2 **[14L+3T]**

Chapter-3: Methods and types of freezing **[6 L]**

- Slow & Quick Freezing
- Contact Freezing.
- Blast Freezing
- Brine Freezing
- Cryogenic Freezing.

- IQF
- Sharp Freezing
- Dehydro Freezing

Chapter-4: Processing of frozen foods **[4 L]**

- Frozen peas
- Corn
- Meat,
- Fish
- Chicken
- Fruits
- Ready to cook foods- French fries, patties, frozen paratha, Frozen snacks

Chapter-5: Packaging and storage of frozen foods **[4 L]**

- Quality
- Labelling
- Packaging materials

REFERENCES BOOKS

- Fruit And Vegetable Preservation Principles And Practices Revised And Enlarged 3Ed by Srivastava.
- Handbook of Frozen Food Processing and Packaging by Da-Wen Sun, Publisher CRC Press.

Course Outcome at the end of course, student will able -

CO1 Illustrate the underlying concepts of various methods of food freezing.
CO2 Outline the basis for extension of storage life of foods by freezing.
CO3 Compare and contrast methods for freezing different foods, and the consequences in terms of food quality.
CO4 Explain factors affecting the rate of freezing.
CO5 Describe the packaging requirements for frozen foods by various methods.

CO6 Explain the spoilage and deterioration mechanisms in foods and methods to control deterioration and spoilage.

FSTMAP 123, Food Sci & Tech Practical Paper-2, Microbiology Practical

Sr. No.	Content	No. of Hours
1	General microbiology Laboratory Rules and Personal Safety Precautions	4
2	Study of Equipment & Instruments in microbiology	4

3	Preparation of nutrient agar media.	4
4	Preparation of EMB agar media.	4
5	Preparation of MacConkey agar media.	4
6	Demonstration of pour plate technique employed in microbiology	4
7	Demonstration of streak plate technique employed in microbiology	4
8	Demonstration of spread plate technique employed in microbiology	4
9	Methods In Study And Identification Of Bacteria	4
10	Study of Serial dilution method is to estimate the concentration of organism in sample	4
11	Study and Preparation of different staining	4
12	To study motility test	4
13	To study different biochemical test	4
14	Preparation of fungal media.	4
15	Study of LPCB	4

16	Study of hanging drop test	4

REFERENCES BOOKS

- A Handbook of Practical Microbiology by R. Saravanan (Author), D. Dhachinamoorthi (Author), CH. MM. Prasada Rao (Author)
- Practical Handbook of Microbiology by Emanuel Goldman (Editor), Lorrence H Green (Editor)

Course Outcome at the end of course, student will able -

CO1: Apply the knowledge to understand the microbial physiology and to identify the microorganisms.

CO2: Demonstrate proper handling of bacteria in the lab by following all safety precautions

CO3: Explain the importance of sterilizing all equipment and materials before use to prevent

Contamination.

CO4: Illustrate the use of an autoclave or other sterilization methods as necessary.

CO5: Classify the different Plating techniques used to grow bacteria.

CO6: Develop skills in media preparation for bacterial growth.

FSTGEP 112, General Elective Food Sci & Tech Practical Paper, Adulteration Practical

Sr. No.	Content	No. of Hours
1	General Laboratory Rules and Personal Safety Precautions	1
2	Detection of Adulteration in Milk	1
3	Detection of Adulteration in Milk Products	1
4	Detection of Adulteration in Edible Oils	1
5	Detection of Adulteration in Fats	1

6	Detection of Adulteration Spices and Condiments	1
7	Detection of Adulterants in Other Foods	1
8	Detection of Artificial Invert Sugar Syrup in Honey (Fieh's Test)	1
9	Detection of Artificially Coloured Tea Dust Mixed with Genuine Tea or Used Tea Leaves	1
10	Detection of Iron Filing in Tea Leaves/Wheat Flour	1
11	Detection of Lead Chromate in Pulses/Other Foods	1
12	Detection of Common Salt in Coriander Powder	1
13	Detection of Adulteration in Fruits & Vegetables .	1
14	Detection of Adulteration in Cereals & Pulses	1
15	Detection of Adulteration in Beverages- Tea	1
16	Detection of Adulteration in Beverages-Coffee	1

REFERENCES BOOKS

- Manual of Analysis of Common Adulteration methods by FSSAI
- Rapid Detection of Food Adulterants and Contaminants: Theory and Practice Hardcover – Import,

Course Outcome at the end of course, student will able -

CO1: Recognize Different Adulterants in Foods

CO2: Illustrate the certain skills of detecting adulteration in common foods.

CO3: Understand the adulteration of common foods & their adverse impact on health and Industrial applications

CO4: Recognize Different sensory analysis methods

CO5: Illustrate the certain skills of sensory analysis in foods.

FSTGET-111, Food Sci & Tech Theory Paper-I,
FOOD ADULTERATION

Note: Each lecture is of 1 hour

Module-1 **[12L+3T]**

Chapter-1: Introduction **[6 L]**

- Adulteration-Definition; types- Intentional, incidental, metallic and packaging hazard.
- Causes and methods of food adulteration.
- General Impact on Human Health.
- Detection and Prevention of Food Adulteration.
- Mitigation measures for addressing food adulteration.

Chapter-2: Food additives **[6 L]**

- Definition, classification,
- Role of additives in processed foods.
- Safety evaluation of additive- GRAS, tolerance level, legal aspects, permitted and non-permitted additives
- Regulatory body and regulation in India (FSSAI)

Module-2 **[12L+3T]**

Chapter-3: Adulteration of Common Foods and Methods of their Detection **[4 L]**

- Composition and adulterant detection in the following Foods- Milk, Edible Oil, Sugar, Spices, honey, flours,
- Ghee
- Beverages- Alcoholic and Non Alcoholic.

Chapter-4: Food safety management systems **[4 L]**

- Importance and application of food regulation in the Indian and Global context
- Responsibilities for maintaining and enforcing food safety FSSAI

Chapter-5: National & International Laws **[4 L]**

- CODEX ALIMENTARIUS,
- HACCP, ISO 22000 series,
- TQM and codes of GMP.
- Auditing, documentation, accreditation and certification (BIS, QCI, AGMARK etc)

REFERENCES BOOKS

- FSSAI MANUAL
- Rapid Detection of Food Adulterants and Contaminants- Theory and Practice
- Food Adulteration and Hygiene by Anupama Rani

Course Outcome at the end of course, student will able –

CO1: Define effects of food adulteration on health.

CO2: Describe broad knowledge of and proficiency in the core functional and support areas of food adulteration.

CO3: Describe the ethical, social and legal issues in adulteration of foods.

CO4: Classify different tests used to detect adulteration.

CO5: Detect the incidence and prevalence of food adulteration.

CO6: Develop a scientific attitude to management techniques and skills in food adulteration tests.

FSTGET-121, Food Sci & Tech Theory paper-II,
PUBLIC HEALTH NUTRITION

Note: Each lecture is of 1 hour

Module-1 **[12L+3T]**

Chapter-1: Definition and Meaning of Health **[6 L]**

- Dimensions and Determination of Health
- Physical Activity and Health benefits
- Effect of exercise on body systems – Circulatory, Respiratory, Endocrine, Skeletal and Muscular Programmes on Community health promotion (Individual, Family and Society)
- Alcohol consumption and drug abuse, medico-legal implications

Chapter-2: Nutrition and Health **[6 L]**

- Concept of Food and Nutrition,
- Balanced diet Vitamins, Malnutrition, Deficiency Disease
- Determining Caloric intake and expenditure
- Obesity, causes and preventing measures
- Role of Diet and Exercise
- BMI

Module-2 **[12L+3T]**

Chapter-3: Safety Education in Health promotion **[4 L]**

- Safety Education in Health promotion
- Principles of Accident prevention
- Health and Safety in daily life.
- Health and Safety at work.
- First aid and emergency care

Chapter-4: Disease and lifestyle management **[4 L]**

- Common injuries and their management.
- Modern life style and hypokinetic diseases.
- Diabetes, Cardiovascular disorders -Prevention and Management.

Chapter-5: Life Skill Education **[4 L]**

- Life skills, emotional adjustment and wellbeing,
- Yoga, Meditation and Relaxation,
- Psychoneuroimmunology

REFERENCES BOOKS

1. Gladys Francis & Mini K.D., (Editors) (2012), Microbiology, Zoological Society of Kerala, Kottayam.

2. PUBLIC HEALTH NUTRITION Rural, Urban, and Global Community-Based Practice M. Margaret Barth, PhD, MPH Ronny A. Bell, PhD, MS Karen Grimmer, PhD, MMedSci, CertHlthEc Editors, Published by Springer

Course Outcome at the end of course, student will able –

CO1 Define the term "nutrition sciences."

CO2 Explain the concept of population health.

CO3 Describe how public health nutrition principles are applied to improve or maintain the optimal health of populations and targeted groups.

CO4 Examine the challenges and limitations of nutrition study designs in public health.

CO5 Discuss recommendations on how to plan, conduct, analyse, and report nutritional studies and investigations in a responsible, safe, and ethical manner.

CO 6 Identify the various approaches and methods used in health research.

FSTGEP-122, Food Sci & Tech Practical paper-II, PUBLIC HEALTH NUTRITION

Sr. No.	Content	No. of Hours
1	Basics of diet planning and importance balanced diet	4
2	BMI Calculation	4
3	Balanced diet planning for adults	4
4	Diet planning for school going children	4
5	Diet planning for adolescents boys	4
6	Diet planning for adolescents girls	4
7	Diet planning for sedentary workers	4
8	Diet planning for old age people	4
9	Diet planning for underweight	4

10	Diet planning for overweight	4
11	Diet planning for hypertension	4
12	Diet planning for pregnant women	4
13	Diet planning for lactating women	4
14	Survey study in a school/ college to find out percentage of anaemia in the adolescent girls	4
15	Diet planning for anaemia	4
16	Survey in a local area to study different common disorders in the population	4

REFERENCES BOOKS

- Practical Public Health Nutrition Roger Hughes
- Practical Manual of Nutrition and Dietetics by Akanksha Yadav

Course Outcome at the end of course, student will able –

CO1: Plan a balanced diet for various age groups.
CO2: Prepare and serve a balanced diet.
CO3: Calculate the nutrients contributed by a diet or meal.
CO4: Justify the choice of food and method of cooking.
CO5: Suggest dietary guidelines for different age groups

FSTVSP-121, Vocational skill Food Sci & Tech Practical paper,
Practical's On Sensory Analysis and Adulteration

Sr. No.	Content	No. of Hours
1	General Laboratory Rules and Personal Safety Precautions	4

2	Detection of Adulteration in Milk	4
3	Detection of Adulteration in Milk Products	4
4	Detection of Adulteration in Edible Oils	4
5	Detection of Adulteration in Fats	4
6	Detection of Adulteration Spices and Condiments	4
7	Sensory Evaluation- General Concepts	4
8	Sensory Evaluation- Taste Identification Test	4
9	Sensory Evaluation- Taste Intensity Tests	4
10	Sensory Evaluation-Hedonic scale ,	4
11	Sensory Evaluation-Triangle test	4
12	Sensory Evaluation- Ranking difference	4
13	Sensory Evaluation- Duo-trio test	4
14	Sensory Evaluation- Paired comparison test	4
15	Detection of basic tastes and their threshold values	4
16	Detection of Adulteration in different food products	4

REFERENCES BOOKS

- Food Adulteration and Its Detection by Jesse P. Battershall
- Foods and Their Adulteration by Harvey Washington Wiley

Course Outcome at the end of course, student will able –

CO1 Gain knowledge on the importance of food quality
CO2 Identify the different sensory characteristics of foods
CO3 Interpret the evaluation techniques and tests used in analysing food quality
CO4 Ability to use terminology, appropriate to the field of sensory analysis, correctly and contextually.
CO5 Categorize various methods for evaluating food quality