**Anekant Education Society's**

# Tuljaram Chaturchand College of Arts, Science & Commerce, Baramati

***(Autonomous)***

## Two Year M.Sc Food Technology Degree

## Program in Food Technology

## (Faculty of Science)

**CBCS Syllabus**

**FY M.Sc (Food Technology)**

**For Department of Food Technology and Research**

**Choice Based Credit System Syllabus**

**(2025 Pattern)**

## (As Per NEP-2020)

**To be implemented from Academic Year 2025-2026**

**Title of the Programme: FY M.Sc. (Food Technology))**

# Preamble

**Preamble**:

AES's, Tuljaram Chaturchand College of Arts, Science and Commerce (Autonomous) has made the decision to change the syllabi of across various faculties from June, 2023 by incorporating the guidelines and provisions outlined in the National Education Policy (NEP), 2020. The NEP envisions making education more holistic and effective and to lay emphasis on the integration of general (academic) education, vocational education and experiential learning. The NEP introduces holistic and multidisciplinary education that would help to develop intellectual, scientific, social, physical, emotional, ethical and moral capacities of the students. The NEP 2020 envisages flexible curricular structures and learning based outcome approach for the development of the students. By establishing a nationally accepted and internationally comparable credit structure and courses framework, the NEP 2020 aims to promote educational excellence, facilitate seamless academic mobility, and enhance the global competitiveness of Indian students. It fosters a system, where educational achievements can be recognized and valued not only within the country but also in the international arena, expanding opportunities and opening doors for students to pursue their aspirations on a global scale.

In response to the rapid advancements in science and technology and the evolving approaches in various domains of Food Technology and related subjects, the Board of Studies in Dept. of Food Technology and Research at Tuljaram Chaturchand College of Arts, Science and Commerce (Autonomous), Baramati - Pune, has developed the curriculum for the first semester of F.Y. M.Voc. Food Technology, which goes beyond traditional academic boundaries. The syllabus is aligned with the NEP 2020 guidelines to ensure that students receive an education that prepares them for the challenges and opportunities of the 21$^{st}$ century. This syllabus has been designed under the framework of the Choice Based Credit System (CBCS), taking into consideration the guidelines set forth by the National Education Policy (NEP) 2020, LOCF (UGC), NCRF, NHEQF, Prof. R.D. Kulkarni's Report, Government of Maharashtra's General Resolution dated 20$^{th}$ April and 16$^{th}$ May 2023, and the Circular issued by SPPU, Pune on 31$^{st}$ May 2023.

A Food Technology Post-Graduates degree equips students with the knowledge and skills necessary for a diverse range of fulfilling career paths. Food Technology post-graduate students find opportunities in various fields, including procurement, Testing and quality control, Processing and Production, Research and Development, Storage and Supply Chain Management, Food Regulatory Agencies, Auditing, Academics, Competitive exams, Biostatistics, Database analysis, Entrepreneurship Development, and many other food and food related organizations.
Throughout their Two-year degree program, students explore the significance of Farm to Fork processing by utilization of post harvest technology. They learn tools, techniques, processes which are required to set up agencies including pickles, jam and jelly, fruit processing, vegetable processing, organic product, dairy products, animal product processing, Bakery and Confectionery products producing industries.

Overall, revising the post-graduate Food Technology syllabi in accordance with the NEP 2020 ensures that students receive an education that is relevant, comprehensive, and prepares them to navigate the dynamic and interconnected world of today. It equips them with the knowledge, skills, and competencies needed to contribute meaningfully to society and pursue their academic and professional goals in a rapidly changing global landscape.

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## Programme Specific Outcomes (PSOs)

| | | |
|---|---|---|
| **PSO -1** | **Disciplinary Knowledge** | Understand the basic concepts, fundamental principles and experimental findings and the scientific theories related to food technology, food science and food technology & engineering and its other fields related to the program. |
| **PSO -2** | **Communication Skills** | Develop various communication skills such as reading, listening and speaking skills to express ideas and views clearly and effectively. |
| **PSO -3** | **Critical Thinking** | Propose novel idea sin explaining the scientific data, facts and figures related to science and technology. |
| **PSO -4** | **Analytical Reasoning and Problem Solving** | To enable the students with good scientific and engineering knowledge so as to comprehend, design,and create food products and devices for the food industry and provide solutions for the challenges in the food industry as well as in agriculture. |
| **PSO -5** | **Sense of Inquiry** | Curiously ask relevant questions for better understanding of fundamental concepts and principles, scientific theories and applications related to the study. |
| **PSO -6** | **Use of Modern Tools** | Operate modern tools, equipment, instruments and laboratory techniques to perform the experiments and write the programs in different languages. |
| **PSO -7** | **Research Skills** | Understand how to design, collect, analyze, interpret and evaluate information/data that is relevant to food technology. |
| **PSO -8** | **Application of Knowledge** | Developascientificoutlookandapplytheknowledgewithrespecttofoodtechnology. |
| **PSO -9** | **Ethical Awareness** | Totrainstudentsinprofessionalandethicalattitude,effectivecommunication skills,teamworkskillsandmultidisciplinaryapproachesrelatedtofoodtechnology andengineering. |
| **PSO -10** | **Teamwork** | Understandthebasicconcepts,fundamentalprinciplesandexperimentalfindings and the scientific theories related to food technology, food science and food technology & engineering and its other fields related to the program. |
| **PSO -11** | **Environmentand Sustainability** | Developvariouscommunicationskillssuchasreading,listeningandspeaking skills to express ideas and views clearly and effectively. |
| **PSO -12** | **LifelongLearning** | Propose novel ideas in explaining the scientific data, facts and figures related to science and technology. |
| | | |

**Anekant Education Society's**
**TuljaramChaturchand College**
**of Arts, Science and Commerce Baramati, Dist-Pune**
***(Empowered Autonomous)***
**Board of Studies in Food Technology and Research**
**(Academic Year 2025-26 to 2027-28)**

| Sr.No. | Name of Member | Designation |
|---|---|---|
| **1.** | **Dr. Khan Wazid A.**<br>Head &Associate Professor<br>Department of Food Technology and Research,<br>T. C. College, Baramati. | **Chairperson** |
| **2.** | **Ms. Katekar Asawari D.**<br>Assistant Professor, Department of Food Technology and Research, T. C. College, Baramati | Member |
| **3.** | **Ms.Pawar Tilotama R.**<br>Assistant Professor,Department of Food Technology and Research, T. C. College, Baramati | Member |
| **4.** | **Ms. Shinde Soudamini S.**<br>Assistant Professor, Department of Food Technology and Research, T. C. College, Baramati | Member |
| **5.** | **Ms. Vaishnavi Ankush Gaikwad**<br>Assistant Professor, Department of Food Technology and Research, T. C. College, Baramati | Member |
| **6.** | **Ms. Prajakta Anil Gawade**<br>Assistant Professor, Department of Food Technology and Research, T. C. College, Baramati | Member |
| **6.** | **Ms. Aarti Dongare**<br>Assistant Professor, M.Sc. Food Science & Technology | Vice-Chancellor Nominee<br>Subject Expert from SPPU, Pune |
| **7.** | **Mr. Gatade Abhijeet**<br>Assistant Professor, Shivaji University, Kolhapur | Subject Expert from Outside the Parent University |
| **8.** | **Mr. Pathan Fayaz L.**<br>Associate Professor, MIT-ADT University | Subject Expert from Outside the Parent University |
| **9.** | **Mr. Gawate Dadasaheb**<br>Director, Di-Roma Ice-cream, Ahmad Nagar | Representative from industry/corporate sector/allied areas |
| **10.** | **Mr. Vairagal Dnyaneshwar**<br>Schreiber Dynamix Pvt. Ltd. Baramati | Member of the College Alumni |
| **11.** | **Ms. Vhora Payal** | UG Student |
| **12.** | **Ms. Pawar Amruta** | PG Student |

# Information

1. **One semester** = 15 weeks (12 weeks actual teaching and 3 weeks for internal evaluation, tutorials, problem solutions, student's difficulty solution, etc.)
2. As per NCrF :
   - Theory course: A minimum of 15 hours of teaching per credit is required.
   - Laboratory course: A minimum of 30 hours in laboratory activities per credit is required.
3. **1-credit theory** = 15 hours i.e. for 1 credit, 1 hour per week teaching is to be performed.

   15 hours of 1-credit are splinted as 12 hours actual teaching + 3 hours Tutorial (practice problem solving sessions, repeated discussion on difficult topics, and discussion on student's difficulties, questions discussion and internal evaluation)

4. **1-credit practical** = 30 hours. Thus, 1 credit practical = 2 contact hours in laboratory per week

   30 hours splinted as 24 hours' actual table work and 6 hours for journal competition, oral on each practical and other internal evaluation.

5. **Each theory courses of any type** (Major, Minor, VSC, VEC, OE/GE, VEC, SEC, CC, etc.) **is of 2 credits**.
   a. **Theory per semester:** Contact hours = 24 teaching + 6 tutorials (problem solving sessions, repeated discussion on difficult topics, difficult solution, questions discussion and internal evaluation)
   b. Each course will be of two modules, One module = 15 hours
   c. Each module may consist of one or more than one chapter.
6. **Each practical course of any course is of 2 credits = 60 hours per semester**
   a. Minimum 12 laboratory sessions must be conducted in one semester.
   b. Each laboratory sessions should be 4 hours.
   c. If practical is short, then two short practicals should be included in one laboratory sessions.
   d. In 12 laboratory sessions maximum 2 demonstration sessions or table work sessions may be included and must be designed carefully for 4 hours' sessions.
   e. 4 hours' laboratory sessions include – performing table work (practical), calculation, writing results and conclusion, and submission of practical in written form to practical in charge.
   f. Pre-laboratory reading and post laboratory work / questions should be assigned on each practical and this will be the part of internal evaluation.
7. **Design syllabus of each theory and practical course as per above guidelines.**
   a. **Theory syllabus** should be given module wise and chapter wise.
   b. **Theory syllabus** should include name of topic, number of teaching hours allotted, detailed point wise syllabus, page numbers, references book no.

**c.** It is recommended that**, design syllabus of one theory course from maximum two references books** and they will be called as main reference books/text books. Below that, you can add names of more reference books and they will be supplementary reference books.

**d. Syllabus of practical** must be given practical wise. Name of experiment and aim of the experiment should be clearly mentioned. Mention reference book number or bibliography for each practical. At least 16 practicals must be included in syllabus from which 12 practicals will be actually conducted. If practical is short, then two short practical's will be considered as one practical.

**e.** At the end of syllabus of theory and practical course, a list of references book should be given number wise.

**f. At the end of each theory and practical course 6 CO should be given.**

## 4.. Names of UG and PG courses related to Specialization

**Important Note:** For specialized subjects wherever designing of practical course is not adequate then included, theory course of 2 credits in place of practical course.

| Semester | Major Courses | Major Elective Curses | Minor Curses | VSC | IKS |
|---|---|---|---|---|---|
| I | 2 theory+ 1 Practical | | | 1 Theory | 1 Theory |
| II | 2 theory+ 1 Practical | | 1 Theory + 1 Practical | 1 Practical | 0 |
| III | 3 theory+ 1 Practical | | 1 Theory + 1 Practical | 1 Theory | 0 |
| IV | 3 theory+ 1 Practical | | 1 Theory + 1 Practical | 1 Practical | 0 |
| V | 3 theory + 2 Practical | 1 Theory + 1 Practical | 1 Theory + 1 Practical | 1 Theory | 0 |
| VI | 3 theory + 2 Practical | 1 Theory + 1 Practical | | 1 Practical | 0 |
| | **VII and VIII Sem honours degree with major** | | | | |
| VII | 5 theory + 2 Practical | 1 Theory + 1 Practical | 0 | 0 | 0 |
| VIII | 5 theory + 2 Practical | 1 Theory + 1 Practical | 0 | 0 | 0 |
| | **VII and VIII Sem honours degree with research** | | | | |

| | | | | | |
|---|---|---|---|---|---|
| VII | 4 theory+ 1 Practical | 1 Theory + 1 Practical | 0 | 0 | 0 |
| VIII | 4 theory+ 1 Practical | 1 Theory + 1 Practical | 0 | 0 | 0 |

- In elective course 2T+2P are related to each other. In this case students have to choose more than 1 option i.e. in elective part, at least 2 courses each consisting of 1 theory 1 practical courses in combination

## Course Structure for F Y. M.Sc (Food Technology) 2025-2026

| Level | Semester | Major | | Research Methodology | OJT/FP | RP | Cum. Cr. |
|---|---|---|---|---|---|---|---|
| | | Mandatory | Elective | | | | |
| 6.0 | I | FTR-501-MJM- Food Microbiology (T) (4 C)<br>FTR-502-MJM- Food Chemistry & Analysis (T) (4C)<br>FTR-503-MJM- Nutrition Science (T) (2 C)<br>FTR-504-MJM- Food Microbiology (P) (2 C)<br>FTR-505-MJM- Food Chemistry & Analysis (P) (2 C) | FTR-511-MJE- Bakery Technology(T) (2 C) **OR** FTR-511-MJE- Confectionery Technology(T) (2 C)<br>FTR-512-MJE- Bakery Technology(P) (2 C) **OR** FTR-512-MJE- Confectionery Technology(P) (2 C) | FTR-521-RM Research Methodology (T)(4C) | | | **22 Cr.** |
| | II | FTR-551-MJM- Food Processing & Packaging (T) (4 C)<br>FTR-552-MJM- Food Additives & Toxicology (T) (4 C)<br>FTR-553-MJM Fermentation Technology (T) (2C)<br>FTR-554-MJM- Food Processing & Packaging (P) (2 C)<br>FTR-555-MJM- Fermentation Technology (P) (2C) | FTR-561-MJE- Beverage Technology(T) (2 C) **OR** FTR-561-MJE-Snacks Technology(T) (2 C)<br>FTR-562-MJE- Beverage Technology(P) (2 C) **OR** FTR-562-MJE Snacks Technology(P) (2 C) | | FTR-581-OJT/ FP (4 C) | | 22 Cr. |
| **Cum. Cr.** | | **28** | **8** | **4** | **4** | **-** | **44** |

| Sem | Course Type | Course Code | Course Title | Theory/ Practical | Credits |
|---|---|---|---|---|---|
| V | Major Mandatory | FTR-501-MJM | Food Microbiology | Theory | 02 |
| | Major Mandatory | FTR -502-MJM | Food Chemistry and Analysis | Theory | 02 |
| | Major Mandatory | FTR -503-MJM | Nutrition Science | Theory | 02 |
| | Major Mandatory | FTR -504-MJM | Food Microbiology | Practical | 02 |
| | Major Mandatory | FTR -505-MJM | Food Chemistry and Analysis | Practical | 02 |
| | Major Elective (MJE) | FTR -506-MJE(A) | Bakery Technology | Theory (Any one) | 02 |
| | | FTR -506-MJE(B) | Confectionery Technology | | |
| | Major Elective (MJE) | FTR -507- MJE (A) | Bakery Technology | Practical (any one) | 02 |
| | | FTR -507- MJE (B) | Confectionery Technology | | |
| | Research Methodology | FTR -508-RM | Research Methodology | Theory | 02 |
| | **Total Credits Semester-I** | | | | **22** |
| VI | Major Mandatory | FTR -551-MJM | Food Processing and Packaging | Theory | 02 |
| | Major Mandatory | FTR -552-MJM | Food Additives and Toxicology | Theory | 02 |
| | Major Mandatory | FTR -553-MJM | Fermentation Technology | Theory | 02 |
| | Major Mandatory | FTR -554-MJM | Food Processing and Packaging | Practical | 02 |
| | Major Mandatory | FTR -555-MJM | Fermentation technology | Practical | 02 |
| | Major Elective (MJE) | FTR -556-MJE(A) | Beverage Technology | Theory (Any two) | 02 |
| | | FTR -556-MJE(B) | Snacks technology | | |
| | Major Elective (MJE) | FTR -557-MN | Beverage Technology | Practical (Any one) | 02 |
| | | FTR -557-MN | Snacks Technology | | |
| | On Job Training(OJT) | FTR -558-OJT | On Job Training/Field Projects | Practical | 04 |
| | | | | **Total Credits Semester-II** | **22** |
| | | | | **Total Credits Semester-I+ II** | **44** |

# CBCS Syllabus as per NEP 2020 for F.Y M.Sc. Food Technology & Research (2025 Pattern)

**Name of the Programme** : M.Sc. Food Technology

**Programme Code** : FTR

**Class** : F.Y M.Sc.

**Semester** : **I**

**Course Code** **: FTR-501-MJM**

**Course Type** **:** Major

**Course Code** **:** FTR-501-MJM

**Course Title** **:** Food Microbiology

**No. of Credits** **: 02**

**No. of Teaching Hours** **:** 30

## Course Objectives:

1. To learn about the food groups
2. To study about the cooking methods
3. To know about working of various equipment used in food processing industries.
4. To get a knowledge about food preservation techniques.
5. To study about the history food processing technology.
6. To learn about the Scope & opportunities in food industries.
7. To study the refrigeration system

## Course Outcomes:

**CO1:** Student will earn about the food groups.
**CO2:** Student will study about the different cooking methods
**CO3:** The students may know about working of various equipment used in food processing industries.
**CO4:**Students will study about the history food processing technology.
**CO5:**The students will learn about the Scope & opportunities in food industries.
**CO6:** Students will get knowledge about food preservation techniques.
**CO7:** The students will know about the advantages & disadvantages of cooking.

## Topics and Learning Points

**Unit-1: Microorganisms and their growth** **12P**

History of microbiology of food.
Types of micro-organism normally associated with food mold, yeast, bacteria.
Microbial growth pattern, physical and chemical factors influencing destruction of micro-organisms.

**Unit-2: Contamination of food** **12P**

Contaminants of foods- stuffs, vegetables, cereals, pulses, oilseeds, milk and meat during handling and processing.

**Unit-3: Spoilage of Food** **12P**

Micro-organisms in natural food products and their control.
Biochemical changes caused by micro- organisms, deterioration and spoilage of various types of food products, microbial food fermentation.

**Unit-4: Food Poisoning** **12P**

Food poisoning and microbial toxins, standards for different foods. Food borne intoxicants and mycotoxins.

**Unit-5: Fermentation** **10P**

Concept of Fermentation, important microorganisms in food fermentation, Processing of Fermented Food Products: Bread, traditional Indian foods, malt beverages, wines, vinegar, fermented vegetables, fermented dairy products, oriental fermented products and Spoilage and defects of fermented food products

**References:**


- Food microbiology (IVth edition) - William C. Frazier and Dennis C. Westoff- Tata McGraw Hill Pub. Co. Ltd, New Delhi, 1995)
- Basic food microbiology-George G. Banwart (CBS publishers & distributors, New Delhi, (1987)
- Food microbiology- M. R. Adams & M. O. Moss (New Age International (P). Ltd. 2000)
- Jay, James M. Modern Food Microbiology, CBS Publication, New Delhi, 2000
- Introduction to Microbiology, M.H.Gajbhiye& S.J. Sathe et al, Career Publications, Nashik, 2015


**Mapping of Program Outcomes with Course Outcomes**

Class: FYMSc Subject: Food Microbiology
Course Type: Major Course Code: FTR-501-MJM
Weightage: 0= No Relation, 1= Weak or low relation, 2= Moderate or partial relation, 3= Strong or direct relation

| CO/ PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | - | - | - | - | - | - | - | 3 | 3 | - | - |
| CO2 | 1 | 1 | - | - | - | 3 | - | - | - | 1 | 3 | - |
| CO3 | - | 1 | - | 2 | 1 | - | - | 3 | - | - | - | - |
| CO4 | 1 | - | 2 | - | - | - | 1 | - | - | 1 | - | 3 |
| CO5 | 2 | - | - | - | 1 | - | - | 2 | 1 | 2 | 1 | - |
| CO6 | 1 | - | - | - | 1 | 4 | - | - | 1 | 1 | - | - |
| CO7 | - | - | 1 | - | - | - | - | - | 1 | - | - | - |

**Justification for the mapping**

**PO1:** Disciplinary knowledge- Understand the basic concepts, fundamental principles and experimental findings and the scientific theories related to food technology, food science and Food technology & engineering and its other fields related to the program.
**CO1:** Student will learn about the food groups.
**CO2:** Student will study about the different cooking methods
**CO4:** Students will study about the history food processing technology.
**CO5:** The students will learn about the Scope & opportunities in food industries.
**CO6:** Students will get knowledge about food preservation techniques.

**PO2:** Communication Skills - Develop various communication skills such as reading, listening and speaking skills to express ideas and views clearly and effectively.
**CO2:** Student will study about the different cooking methods
**CO3:** The students may know about working of various equipment used in food processing industries.

**PO3:** Critical Thinking- Propose novel idea sin explaining the scientific data, facts and figures related to science and technology.
**CO4:** Students will study about the history food processing technology.
**CO7:** The students will know about the advantages & disadvantages of cooking.

**PO4:** Analytical reasoning and problem solving to unable the students with good scientific and engineering knowledge so as to comprehend, design and create food products and devices for food industry and provide solutions for the challenges in the food industry as well as in the agriculture.
**CO3:** The students may know about working of various equipment used in food processing industries.

**PO5:**Sense of Inquiry Curiously ask relevant questions for better understanding of fundamental concepts and principles, scientific theories and applications related to the study.
**CO3:** The students may know about working of various equipment used in food processing industries.
**CO5:** The students will learn about the Scope & opportunities in food industries.
**CO6:** Students will get knowledge about food preservation techniques.

**PO6:** Use of modern tools To operate modern tools, equipment, instrument and laboratory techniques to perform the experiments and write the programmes in the different languages.
**CO2:** Student will study about the different cooking methods
**CO6:** Students will get knowledge about food preservation techniques.

**PO7:** Research skills Understand how to design, collect, analyze, interpret and evaluate information/data that is relevant to food technology.
**CO4:** Students will study about the history food processing technology.

**PO8:** Application of knowledge Develop a scientific outlook and apply the knowledge with respect to food technology.

**CO3:** The students may know about working of various equipment used in food processing industries.
**CO5:** The students will learn about the Scope & opportunities in food industries.

**PO9:** Ethical awareness to train students in professional and ethical attitude, effective communication skills, team work skills, and multidisciplinary approaches related to food technology and engineering.
**CO1:** Student will learn about the food groups.
**CO5:** The students will learn about the Scope & opportunities in food industries.
**CO6:** Students will get knowledge about food preservation techniques.
**CO7:** The students will know about the advantages & disadvantages of cooking.

**PO10:** Team Work understand the basic concepts, fundamental principles and experimental findings and the scientific theories related to food technology, food science and food technology and engineering and its other fields related to the programme.
**CO1:** Student will learn about the food groups.
**CO2:** Student will study about the different cooking methods
**CO4:** Students will study about the history food processing technology.
**CO5:** The students will learn about the Scope & opportunities in food industries.
**CO6:** Students will get knowledge about food preservation techniques.

**PO11:** Environmental sustainability Develop various communication skills such and reading, listening and speaking skills to express ideas and views clearly and effectively.
**CO2:** Student will study about the different cooking methods
**CO5:** The students will learn about the Scope & opportunities in food industries.

**PO12:** Lifelong learning Propose novel ideas in explain the scientific data, fact and figures related to science and technology.
**CO4:** Students will study about the history food processing technology.

## CBCS Syllabus as per NEP 2020 for F.Y MSc. Food Technology & Research (2025 Pattern)

| | |
|---|---|
| **Name of the Programme** | **:** M.Sc. Food Technology |
| **Programme Code** | **:** FTR |
| **Class** | **:** F.Y M.Sc. |
| **Semester** | **: I** |
| **Course Code** | **: FTR-502-MJM** |

**Course Type** : Major

**Course Title** : Food Chemistry and Analysis

**No. of Credits** : **02**

**No. of Teaching Hours** : 30

## Course Objectives:

1. To learn about the food groups
2. To study about the cooking methods
3. To know about working of various utensils used in food processing industries.
4. To get a knowledge about food preservation techniques.
5. To study about the weight and measures
6. To learn about the mode of heat transfer.
7. To get knoledge about refrigration system.

## Course Outcomes:

**CO1:** Student will learn about the food groups.
**CO2:** Student will study about the different cooking methods
**CO3:** the students may know about working of various utensils used in food processing industries.
**CO4:** Students will get knowledge about food preservation techniques
**CO5:**The students will learn about the weight and measures used in food processing
**CO6:** Students will get knowledge about mode of heat transfer.
**CO7:** The students will know about the refrigration system.

## Topics and Learning Points

**Unit I: Introduction to basic concepts of food chemistry** **06 P**
Overview of food chemistry, Introduction to food groups, moisture in food, physic-chemical properties of water and ice, water structure, water interactions, water activity.

**Unit II: Carbohydrates and proteins** **15 P**
Carbohydrates- sources, simple and complex sugars-basic chemistry, sugar derivatives, structures and properties of starch, cellulose, gums, hydrocolloids and dietary fibres.
Proteins– sources, properties and structure of amino acid, protein denaturation, functional properties of protein in food, wheat proteins (dough formation), common food proteins.

**Unit III: Lipids, enzymes and minerals** **12 P**
**Lipids-** Introduction, nomenclature and structure, characteristics, classes, processing, lipid oxidation, physical properties.
**Enzymes** - nature, chemistry, applications in food industry, control of enzyme action in food.

**Minerals and vitamins-** sources and structure, effect of processing and storage, provitamin A & D as antioxidants, food pigments and flavouring agents – importance, types and sources changes during processing and storage.

**Unit IV: Basics in food analysis** **10 P**

Introduction, sample preparations, sampling methods.
Importance of analysis in industry.
Basic Electrophoresis techniques used in food analysis

**Unit V: Chromatographic techniques** **07P**

Chromatographic techniques- classification, Paper, TLC, HPLC, Column, Affinity, Ion-exchange

**Unit VI: Determinative Techniques** **10 P**

Methods used for Extraction, distillation, titration. Protein, fat, moisture, ash, fibre and carbohydrate analysis methods

## References:

1. Fennema, Owen R, Food Chemistry, 3rd Ed., Marcell Dekker, New York, 1996
2. Whitehurst and Law, Enzymes in Food Technology, CRC Press, Canada, 2002
3. Wong, Dominic WS, Food Enzymes, Chapman and Hall, New York, 1995
4. Potter,N.N.and Hotchkiss,J.H, Food Science, 5th Ed., Chapman & Hall,1995
5. DeMan, John M., Principles of Food Chemistry ,3rd Ed., Springer 1999
6.Desrosier, Norman W. and Desrosier.,James N.,The technology of food preservation , 4th Ed.,Westport, Conn. : AVI Pub. Co., 1977.
7. Fuller, Gordon W, New Product Development From Concept to Marketplace, CRC Press,2004.
8. Manay, S. & Shadaksharaswami, M., Foods: Facts and Principles, New Age Publishers, 2004
9. Ranganna S, Handbook of Analysis and Quality Control for Fruits and Vegetable Products, 2nd ed. TMH Education Pvt. Ltd, 1986
10. Essentials of Food Science – Vickie A. Vaclavik, Elizabeth W. Chrishtian

### Mapping of Program Outcomes with Course Outcomes

Class: FYMSc Subject: Food Chemistry and Analysis
Course Type: Major Course Code: FTR-502-MJM
Weightage: 0= No Relation, 1= Weak or low relation, 2= Moderate or partial relation, 3= Strong or direct relation

| CO/ PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | - | - | - | - | - | - | - | 3 | 2 | - | - |
| CO2 | 1 | 1 | - | - | - | 3 | - | - | - | - | 3 | - |
| CO3 | - | 1 | - | 2 | 1 | - | - | 3 | - | - | - | - |
| CO4 | 1 | - | 2 | - | - | - | 1 | - | - | 2 | - | 3 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO5** | - | - | - | 3 | - | 3 | 2 | - | - | - | - | - |
| **CO6** | 2 | - | - | 2 | - | 3 | 2 | - | 1 | - | - | - |
| **CO7** | - | - | - | 3 | 2 | 3 | - | 1 | - | 2 | - | 1 |

**PO1:** Disciplinary knowledgeUnderstand the basic concepts, fundamental principles and experimental findings and the scientific theories related to food technology, food science and Food technology & engineering and its other fields related to the program.
**CO1:** Student will learn about the food groups.
**CO2:** Student will study about the different cooking methods
**CO4:** Students will get knowledge about food preservation techniques
**CO6:** Students will get knowledge about mode of heat transfer.

**PO2:**Communication Skills - Develop various communication skills such as reading, listening and speaking skills to express ideas and views clearly and effectively.
**CO2:** Student will study about the different cooking methods
**CO3:** the students may know about working of various utensils used in food processing industries.

**PO3:** Critical Thinking- Propose novel idea sin explaining the scientific data, facts and figures related to science and technology**.**
**CO4:** Students will get knowledge about food preservation techniques

**PO4:** Analytical reasoning and problem solving To unable the students with good scientific and engineering knowledge so as to comprehend, design and create food products and devices for food industry and provide solutions for the challenges in the food industry as well as in the agriculture.
**CO3:** the students may know about working of various utensils used in food processing industries.
**CO5:**The students will learn about the weight and measures used in food processing
**CO6:** Students will get knowledge about mode of heat transfer.
**CO7:** The students will know about the refrigration system.

**PO5:**Sense of Inquiry Curiously ask relevant questions for better understanding of fundamental concepts and principles, scientific theories and applications related to the study.
**CO3:** the students may know about working of various utensils used in food processing industries.
**CO7:** The students will know about the refrigration system.

**PO6:** Use of modern tools operate modern tools, equipment, instrument and laboratory techniques to perform the experiments and write the programmes in the different languages.
**CO2:** Student will study about the different cooking methods
**CO5:**The students will learn about the weight and measures used in food processing
**CO6:** Students will get knowledge about mode of heat transfer.
**CO7:** The students will know about the refrigration system.

**PO7**: Research skills Understand how to design, collect, analyze, interpret and evaluate information/data that is relevant to food technology.
**CO4:** Students will get knowledge about food preservation techniques
**CO5:**The students will learn about the weight and measures used in food processing
**CO6:** Students will get knowledge about mode of heat transfer.

**PO8:** Application of knowledge Develop a scientific outlook and apply the knowledge with respect to food technology.
**CO3:** the students may know about working of various utensils used in food processing industries.
**CO7:** The students will know about the refrigration system.

**PO9**: Ethical awareness To train students in professional and ethical attitude, effective communication skills, team work skills, and multidisciplinary approaches related to food technology and engineering.
**CO1:** Student will learn about the food groups.
**CO6:** Students will get knowledge about mode of heat transfer.

**PO10:** Team Work understand the basic concepts, fundamental principles and experimental findings and the scientific theories related to food technology, food science and food technology and engineering and its other fields related to the programme.
**CO1:** Student will learn about the food groups.
**CO4:** Students will get knowledge about food preservation techniques
**CO7:** The students will know about the refrigration system.

**PO11:** Environmental sustainability. Develop various communication skills such and reading, listening and speaking skills to express ideas and views clearly and effectively.
**CO2:** Student will study about the different cooking methods

**PO12**: Lifelong learning Propose novel ideas in explain the scientific data, fact and figures related to science and technology.
**CO4:** Students will get knowledge about food preservation techniques
**CO7:** The students will know about the refrigration system.

## CBCS Syllabus as per NEP 2020 for F.Y MSc. Food Technology & Research (2025 Pattern)

**Name of the Programme** **:** M.Sc. Food Technology

**Programme Code** **:** FTR

**Class** **:** F.Y M.Sc.

**Semester** **: I**

**Course Code** **: FTR-503-MJM**

**Course Type** **:** Major

**Course Title** **:** Nutrition Science

**No. of Credits** **: 02**

**No. of Teaching Hours** **:** 30

## Course Objectives:

1. To learn about the importance of food safety
2. To study the different types of hazards
3. To study the morphology of different microorganisms.
4. To study about the factors affecting the growth of micro-organisms.
5. To learn about important microorganisms used in food processing industry.
6. To learn about accreditation and auditing.
7. To get knowledge about the growth curve.

## Course Outcomes:

**CO1:** Students will get knowledge about the importance of food safety and morphology of micro-organisms.
**CO2:**Students will have a thorough understanding of various factors responsible for food spoilage.
**CO3:**The students will know the important microorganisms used in food processing industry.
**CO4:** Student will learn about the different types of hazards
**CO5:** Students will get knowledge about accreditation and auditing
**CO6** Students willlearn about important microorganisms used in food processing industry.
**CO7:** Students will learn about growth curve.

## Topics and Learning Points

**Unit-I: Basics of nutrition** **07P**

Introduction to human nutrition, Macronutrients and micronutrients- Classification and functions, Digestion, absorption and assimilation of nutrients.

**Unit-II: Energy metabolism** **07P**

Energy metabolism - Components of energy expenditure, Basal Metabolic Requirements and Activity, Recommended Dietary Allowances, Food Groups.
Concept of a balanced diet, Methods of evaluation of nutritive value of foods.
Nutrition a assessment and nutritional policies-Salient features, concept of community nutrition.

**Unit-III: Carbohydrates and Proteins** **08P**

Carbohydrates- Types, functions, sources, requirement, storage.
Effect of deficiency and excess.
Proteins- Types, functions, sources, requirement, storage.
Effect of deficiency and excess.

**Unit-IV: Fat, Vitamins and Minerals** **08P**

Fat-Types, functions, sources, requirement, storage, Effect of deficiency and excess Vitamin Types, functions, sources, requirement, storage, Effect of deficiency and excess. Minerals-Types, functions, sources, requirement, storage, Effect of deficiency and excess. Water and electrolytes-Concept and importance

**References:**

1. Nutrition Science by B. Srilakshmi
2. Fundamentals of Foods & Nutrition by SumatiR.
3. Mudambi Textbook of Nutrition: A Lifecycle approach by Ravinder Chadha.

**Mapping of Program Outcomes with Course Outcomes**

Class: FYMSc Subject: Nutrition Science
Course Type: Major Course Code: FTR-503-MJM
Weightage: 0= No Relation, 1= Weak or low relation, 2= Moderate or partial relation, 3= Strong or direct relation

| CO/ PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 6 | - | - | - | - | - | - | - | 2 | 2 | - | - |
| CO2 | - | - | 2 | 6 | 5 | 6 | 6 | - | - | - | - | 6 |
| CO3 | - | - | - | - | - | - | - | - | - | - | - | 2 |
| CO4 | - | 2 | - | - | 2 | - | - | 4 | - | - | 6 | - |
| CO5 | - | - | 2 | - | 2 | 2 | - | 2 | - | 2 | - | - |
| CO6 | 4 | - | - | - | 2 | - | - | - | - | 2 | - | - |
| CO7 | 2 | - | 1 | 4 | 2 | 6 | - | - | - | - | - | - |

**Justification for the mapping**

**PO1:** Disciplinary knowledge- Understand the basic concepts, fundamental principles and experimental findings and the scientific theories related to food technology, food science and Food technology & engineering and its other fields related to the program.
**CO1:** Students will get knowledge about the importance of food safety and the morphology of micro-organisms.

**CO6:** Students will learn about important microorganisms used in food processing industry.
**CO7:** Students will learn about growth curve.

**PO2**Communication Skills - Develop various communication skills such as reading, listening and speaking skills to express ideas and views clearly and effectively.
**CO4:** Student will learn about the different types of hazards

**PO3:** Critical Thinking- Propose novel idea sin explaining the scientific data, facts and figures related to science and technology**.**
**CO2:** Students will have a thorough understanding of various factors responsible for food spoilage.
**CO5:** Students will get knowledge about accreditation and auditing
**CO7:** Students will learn about growth curve.

**PO4:** Analytical reasoning and problem solving to unable the students with good scientific and engineering knowledge so as to comprehend, design and create food products and devices for food industry and provide solutions for the challenges in the food industry as well as in the agriculture.
**CO1:** Students will get knowledge about the importance of food safety and morphology of micro-organisms.
**CO7:** Students will learn about growth curve.

**PO5:** Sense of Inquiry Curiously ask relevant questions for better understanding of fundamental concepts and principles, scientific theories and applications related to the study.
**CO2:** Students will have a thorough understanding of various factors responsible for food spoilage.
**CO4:** Student will learn about the different types of hazards
**CO5:** Students will get knowledge about accreditation and auditing
**CO6** Students will earn about important microorganisms used in food processing industry.
**CO7:** Students will learn about growth curve.

**PO6:** Use of modern tools operate modern tools, equipment, instrument and laboratory techniques to perform the experiments and write the programmes in the different languages.
**CO2:** Students will have a thorough understanding of various factors responsible for food spoilage.
**CO5:** Students will get knowledge about accreditation and auditing
**CO7:** Students will learn about growth curve.

**PO7:** Research skills Understand how to design, collect, analyze, interpret and evaluate information/data that is relevant to food technology.
**CO2:** Students will have a thorough understanding of various factors responsible for food spoilage.

**PO8:** Application of knowledge Develop a scientific outlook and apply the knowledge with respect to food technology.

**CO4:** Student will learn about the different types of hazards
**CO5:** Students will get knowledge about accreditation and auditing

**PO9:** Ethical awareness to train students in professional and ethical attitude, effective communication skills, team work skills, and multidisciplinary approaches related to food technology and engineering.
**CO1:** Students will get knowledge about the importance of food safety and morphology of micro-organisms.

**PO10:** Team Work understand the basic concepts, fundamental principles and experimental findings and the scientific theories related to food technology, food science and food technology and engineering and its other fields related to the programme.
**CO1:** Students will get knowledge about the importance of food safety and morphology of micro-organisms.
**CO5:** Students will get knowledge about accreditation and auditing
**CO6** Students will earn about important microorganisms used in food processing industry.

**PO11:** Environmental sustainability Develop various communication skills such and reading, listening and speaking skills to express ideas and views clearly and effectively.
**CO4:** Student will learn about the different types of hazards

**PO12:** Lifelong learning Propose novel ideas in explain the scientific data, fact and figures related to science and technology.
**CO2:** Students will have a thorough understanding of various factors responsible for food spoilage.
**CO3:** The students will know the important microorganisms used in food processing industry.

## CBCS Syllabus as per NEP 2020 for F.Y MSc. Food Technology & Research (2025 Pattern)

| | |
|---|---|
| **Name of the Programme** | **:** M.Sc. Food Technology |
| **Programme Code** | **:** FTR |
| **Class** | **:** F.Y M.Sc. |
| **Semester** | **: I** |
| **Course Code** | **: FTR-504-MJM** |
| **Course Type** | **:** Major |
| **Course Title** | **:** Practical of Food Microbiology |

**No. of Credits : 02**

## Course Objectives:

1. To learn about the basic laboratory safety practices.
2. To learn about maintaining personnel hygiene in food processing area.
3. To study the safety measures of laboratory instruments, material &glasswares.
4. To study the safety measures of various laboratory chemicals.
5. To learn importance of sanitation and sterilization in food preparation.
6. To study important microorganisms in food.
7. To study quality analysis of water.

## Course Outcomes:

**CO1:** Students will get knowledge about the safety laboratory practices.
**CO2:** Students will learn about safety measures of various laboratory chemicals.
**CO3: S**tudents will have a thorough understanding of different microorganisms.
**CO4:** The students will know the cultivation of microbes by using various food samples.
**CO5:** Student will learn about importance of surface sanitation.
**CO6:** Students will learn about morphology of bacteria.
**CO7:** The students will know about the quality analysis of water.

## Topics and LearningPoints

| Sr. No. | Practical Name | Periods |
|---|---|---|
| **1.** | Introduction to basic laboratory practices | **1P** |
| **2.** | Working principle of basic laboratory instruments | **4P** |
| **3.** | Study of aseptic techniques | **2P** |
| **4.** | Study of microscopy & micrometry | **4P** |
| **5.** | Cleaning and sterilization of glasswares | **4P** |
| **6.** | To study inoculation techniques | **4 P** |
| **7.** | Preparation & sterilization of media & disinfectants | **4P** |
| **8.** | Methods of determining conc. of micro-organisms in a sample | **4P** |
| **9.** | Methods of determining concentration of micro-organisms in a sample | **2P** |
| **10.** | Preparation of broth/ slant/ stab & plates | **3P** |
| **11.** | Isolation& preparation of pure culture of bacteria | **3P** |
| **12.** | To study the different types of staining process | **4P** |
| **13.** | Preparation of saline & smear | **4P** |
| **14.** | Various biochemical test to identification of commonly found bacteria in food | **2P** |

| | | |
|---|---|---|
| **15.** | Hazard Analysis Critical Control Points-Case Study | **3P** |
| **16.** | Maintain of stock culture | |

**References:**


- Food microbiology (IVth edition) - William C. Frazier and Dennis C. Westoff- Tata McGraw Hill Pub. Co. Ltd, New Delhi, 1995)
- Basic food microbiology-George G. Banwart (CBS publishers & distributors, New Delhi, 1987)
- Food microbiology- M. R. Adams & M. O. Moss (New Age International (P). Ltd. 2000)
- Jay, James M. Modern Food Microbiology, CBS Publication, New Delhi, 2000
- Introduction to Microbiology, M.H. Gajbhiye& S.J. Sathe et al, Career Publications, Nashik.


**Mapping of Program Outcomes with Course Outcomes**

Class: FY MSc Subject: Practical of Food Microbiology

Course Type: Major Course Code: FTR-504-MJM

Weightage: 0= No Relation, 1= Weak or low relation, 2= Moderate or partial relation, 3= Strong or direct relation

| CO/ PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | **3** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **3** | **3** | **-** | **-** |
| **CO2** | **1** | **1** | **-** | **-** | **-** | **3** | **-** | **-** | **-** | **1** | **3** | **-** |
| **CO3** | **-** | **1** | **-** | **2** | **1** | **-** | **-** | **3** | **-** | **-** | **-** | **-** |
| **CO4** | **1** | **-** | **2** | **-** | **-** | **-** | **1** | **-** | **-** | **1** | **-** | **3** |
| **CO5** | **2** | **-** | **-** | **-** | **1** | **-** | **-** | **2** | **1** | **2** | **1** | **-** |
| **CO6** | **1** | **-** | **-** | **-** | **1** | **4** | **-** | **-** | **1** | **1** | **-** | **-** |
| **CO7** | **-** | **-** | **1** | **-** | **-** | **-** | **-** | **-** | **1** | **-** | **-** | **-** |

**Justification for the mapping**

**PO1:** Disciplinary knowledge- Understand the basic concepts, fundamental principles and experimental findings and the scientific theories related to food technology, food science and Food technology & engineering and its other fields related to the program.
**CO1:** Students will get knowledge about the safety laboratory practices.
**CO6:** Students will learn about morphology of bacteria.
**CO7:** The students will know about the quality analysis of water.

**PO2:**Communication Skills - Develop various communication skills such as reading, listening and speaking skills to express ideas and views clearly and effectively.
**CO4:** The students will know the cultivation of microbes by using various food samples.

**PO3:** Critical Thinking- Propose novel idea sin explaining the scientific data, facts and figures related to science and technology**.**
**CO2:** Students will learn about safety measures of various laboratory chemicals.
**CO5:** Student will learn about importance of surface sanitation.
**CO7:** The students will know about the quality analysis of water.

**PO4**: Analytical reasoning and problem solvingTo unable the students with good scientific and engineering knowledge so as to comprehend, design and create food products and devices for food industry and provide solutions for the challenges in the food industry as well as in the agriculture.
**CO2:** Students will learn about safety measures of various laboratory chemicals.
**CO7:** The students will know about the quality analysis of water.

**PO5:**Sense of InquiryCuriously ask relevant questions for better understanding of fundamental concepts and principles, scientific theories and applications related to the study.
**CO2:** Students will learn about safety measures of various laboratory chemicals.
**CO4:** The students will know the cultivation of microbes by using various food samples.
**CO5:** Student will learn about importance of surface sanitation.
**CO6:** Students will learn about morphology of bacteria.
**CO7:** The students will know about the quality analysis of water.

**PO6:** Use of modern tools operate modern tools, equipment, instrument and laboratory techniques to perform the experiments and write the programmes in the different languages.
**CO2:** Students will learn about safety measures of various laboratory chemicals.
**CO5:** Student will learn about importance of surface sanitation.
**CO7:** The students will know about the quality analysis of water.

**PO7:** Research skills Understand how to design, collect, analyze, interpret and evaluate information/data that is relevant to food technology.
**CO2:** Students will learn about safety measures of various laboratory chemicals.

**PO8:** Application of knowledge Develop a scientific outlook and apply the knowledge with respect to food technology.
**CO4:** The students will know the cultivation of microbes by using various food samples.
**CO5:** Student will learn about importance of surface sanitation.

**PO9:** Ethical awareness to train students in professional and ethical attitude, effective communication skills, team work skills, and multidisciplinary approaches related to food technology and engineering.
**CO1:** Students will get knowledge about the safety laboratory practices.

**PO10:** Team Work understand the basic concepts, fundamental principles and experimental findings and the scientific theories related to food technology, food science and food technology and engineering and its other fields related to the programme.

**CO1:** Students will get knowledge about the safety laboratory practices.
**CO5:** Student will learn about importance of surface sanitation.
**CO6:** Students will learn about morphology of bacteria.

**PO11:** Environmental sustainability. Develop various communication skills such and reading, listening and speaking skills to express ideas and views clearly and effectively.
**CO4:** The students will know the cultivation of microbes by using various food samples.

**PO12:** Lifelong learning Propose novel ideas in explain the scientific data, fact and figures related to science and technology.
**CO2:** Students will learn about safety measures of various laboratory chemicals.
**CO3: S**tudents will have a thorough understanding of different microorganisms.

## CBCS Syllabus as per NEP 2020 for F.Y MSc. Food Technology & Research (2025 Pattern)

**Name of the Programme** **:** M.Sc. Food Technology

**Programme Code** **:** FTR

**Class** **:** F.Y M.Sc.

**Semester** **: I**

**Course Code** **: FTR-505-MJM**

**Course Type** **:** Major

**Course Title** **:** Practical of Food Chemistry and Analysis

**No. of Credits** **: 02**

**No. of Teaching Hours** **:** 30

### Course Objectives:

1. To make students aware about scope and opportunities in food processing sector.
2. To make students aware of different functions of food.
3. To make students aware about role of various food groups human diet.
4. To make students understand the nutritive value of foods.
5. To make student understand basic principles of cooking and its effect on different foods.
6. To study about the composition of different food groups.
7. To study about Toxins present in foods and its elimination.

## Course Outcomes:

**CO 1:**To make students aware about scope and opportunities in food processing sector.
**CO 2:** To make students aware of different functions of food.
**CO 3:** To make students aware about role of various food groups human diet.
**CO 4:** To make students understand the nutritive value of foods.
**CO 5:** To make student understand basic principles of cooking and its effect on different foods.
**CO 6:** To study about the composition of different food groups.
**CO 7:** To study about Toxins present in foods and its elimination.

## Topics and Learning Points

| Sr. No. | Practical Name | Periods |
|---|---|---|
| **1.** | Working principle of instruments used in food analysis | **1P** |
| **2.** | Estimation of moisture by oven method | **4P** |
| **3.** | Estimation of ash by muffle furnace | **2P** |
| **4.** | Estimation of fat by Soxhlet method | **4P** |
| **5.** | Estimation of protein by: a) Biuret method b) Kjeldahl method | **4P** |
| **6.** | Estimation of iron in food sample | **4 P** |
| **7.** | Determination of pigments in food sample | **4P** |
| **8.** | Determination of Vitamin C in food sample | **4P** |
| **9.** | Determination of acidity of beverages and juices | **2P** |
| **10.** | Determination of reducing and non–reducing sugars | **3P** |
| **11.** | Determination of starch in food sample | **3P** |
| **12.** | Analysis of oil: a) Saponification value, b) Acid value, c)Iodine number, d)Iodine number | **4P** |
| **13.** | Determination of essential amino acids | **4P** |
| **14.** | Quality analysis of food products | **2P** |
| **15.** | Analysis of water | **3P** |

## References:


- Fennema, Owen R, Food Chemistry, 3rd Ed., Marcell Dekker, New York, 1996
- Whitehurst and Law, Enzymes in Food Technology, CRC Press, Canada, 2002
- Wong, Dominic WS, Food Enzymes, Chapman and Hall, New York, 1995
- Potter,N.N.and Hotchkiss,J.H, Food Science, 5th Ed., Chapman & Hall,1995 DeMan, John M., Principles of Food Chemistry ,3rd Ed., Springer 1999
- Desrosier, Norman W. and Desrosier.,James N.,The technology of food preservation , 4th Ed.,Westport, Conn. : AVI Pub. Co., 1977.

- Ranganna S, Handbook of Analysis and Quality Control for Fruits and Vegetable Products, 2nd ed. TMH Education Pvt. Ltd, 1986


## Mapping of Program Outcomes with Course Outcomes

FYMSc Subject: Practical of Food Chemistry and Analysis

Course Type: Major Course Code: FTR-505-MJM

Weightage: 0= No Relation, 1= Weak or low relation, 2= Moderate or partial relation, 3= Strong or direct relation

| CO/ PO | PO1 | PO2 | PO3 | PO4 | PO5 | P O6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | - | - | - | 2 | - | - | - | - | 2 | - | - |
| CO2 | 2 | - | - | 2 | 2 | - | 2 | - | - | 2 | - | 5 |
| CO3 | 2 | - | - | 6 | - | 6 | 2 | 2 | - | 4 | - | - |
| CO4 | 1 | 3 | 3 | 2 | - | 5 | - | - | - | 2 | - | - |
| CO5 | - | - | - | 6 | 6 | 5 | 4 | 2 | - | 2 | - | 2 |
| CO6 | 1 | - | 2 | 4 | 3 | 6 | 5 | - | - | 2 | 3 | - |
| CO7 | - | - | 3 | 6 | - | 7 | 5 | - | 2 | 4 | - | - |

### Justification for the mapping

**PO1:** Disciplinary knowledge-Understand the basic concepts, fundamental principles and experimental findings and the scientific theories related to food technology, food science and Food technology & engineering and its other fields related to the program.
**CO 1:** To make students aware about scope and opportunities in food processing sector.
**CO 2:** To make students aware of different functions of food.
**CO 3:** To make students aware about role of various food groups human diet.
**CO 4:** To make students understand the nutritive value of foods.
**CO 6:** To study about the composition of different food groups.

**PO2:**Communication Skills - Develop various communication skills such as reading, listening and speaking skills to express ideas and views clearly and effectively.
**CO 4:** To make students understand the nutritive value of foods.

**PO3:** Critical Thinking- Propose novel idea sin explaining the scientific data, facts and figures related to science and technology**.**
**CO 4:** To make students understand the nutritive value of foods.
**CO 6:** To study about the composition of different food groups.
**CO 7:** To study about Toxins present in foods and its elimination.

**PO4:** Analytical reasoning and problem solvingTo unable the students with good scientific and engineering knowledge so as to comprehend, design and create food products and devices for

food industry and provide solutions for the challenges in the food industry as well as in the agriculture.
**CO 2:** To make students aware of different functions of food.
**CO 3:** To make students aware about role of various food groups' in human diet.
**CO 4:** To make students understand the nutritive value of foods.
**CO 5:** To make student understand basic principles of cooking and its effect on different foods.
**CO 6:** To study about the composition of different food groups.
**CO 7:** To study about Toxins present in foods and its elimination.

**PO5:**Sense of Inquiry Curiously ask relevant questions for better understanding of fundamental concepts and principles, scientific theories and applications related to the study.
**CO 1:** To make students aware about scope and opportunities in food processing sector.
**CO 2:** To make students aware of different functions of food.
**CO 5:** To make student understand basic principles of cooking and its effect on different foods.
**CO 6:** To study about the composition of different food groups.

**PO6:** Use of modern tools operates modern tools, equipment, instrument and laboratory techniques to perform the experiments and write the programmes in the different languages.
**CO 3:** To make students aware about role of various food groups in human diet.
**CO 4:** To make students understand the nutritive value of foods.
**CO 5:** To make student understand basic principles of cooking and its effect on different foods.
**CO 6:** To study about the composition of different food groups.
**CO 7:** To study about Toxins present in foods and its elimination.

**PO7:** Research skills Understand how to design, collect, analyze, interpret and evaluate information/data that is relevant to food technology.
**CO 2:** To make students aware of different functions of food.
**CO 3:** To make students aware about role of various food groups in human diet.
**CO 5:** To make student understand basic principles of cooking and its effect on different foods.
**CO 6:** To study about the composition of different food groups.
**CO 7:** To study about Toxins present in foods and its elimination.

**PO8:** Application of knowledge develop a scientific outlook and apply the knowledge with respect to food technology.
**CO 3:** To make students aware about role of various food groups in human diet.
**CO 5:** To make student understand basic principles of cooking and its effect on different foods.

**PO9:** Ethical awareness To train students in professional and ethical attitude, effective communication skills, team work skills, and multidisciplinary approaches related to food technology and engineering.
**CO 7:** To study about Toxins present in foods and its elimination.

**PO10:** Team Work understand the basic concepts, fundamental principles and experimental findings and the scientific theories related to food technology, food science and food technology and engineering and its other fields related to the programme.
**CO 1:** To make students aware about scope and opportunities in food processing sector.

**CO 2:** To make students aware of different functions of food.
**CO 3:** To make students aware about role of various food groups human diet.
**CO 4:** To make students understand the nutritive value of foods.
**CO 5:** To make student understand basic principles of cooking and its effect on different foods.
**CO 6:** To study about the composition of different food groups.
**CO 7:** To study about Toxins present in foods and its elimination.

**PO 11:** Environmental sustainability Develop various communication skills such and reading, listening and speaking skills to express ideas and views clearly and effectively.
**CO 6:** To study about the composition of different food groups.

**PO 12** Lifelong learning Propose novel ideas in explain the scientific data, fact and figures related to science and technology.
**CO 2:** To make students aware of different functions of food.
**CO 5:** To make student understand basic principles of cooking and its effect on different foods.

## CBCS Syllabus as per NEP 2020 for F.Y MSc. Food Technology & Research (2025 Pattern)

**Name of the Programme** **:** M.Sc. Food Technology

**Programme Code** **:** FTR

**Class** **:** F.Y M.Sc.

**Semester** **: I**

**Course Code** **: FTR-506-MJE (A)**

**Course Type** **:** Major

**Course Title** **:** Bakery Technology

**No. of Credits** **: 02**

**No. of Teaching Hours** **:** 30

### Course Objectives:

1. To make students aware about scope and opportunities in food processing sector.
2. To make students aware of different functions of food.
3. To make students aware about role of various food groups human diet.
4. To make students understand the nutritive value of foods.
5. To make student understand basic principles of cooking and its effect on different foods.
6. To study about the composition of different food groups.
7. To study about Toxins present in foods and its elimination.

## CourseOutcomes:

**CO 1:** To make students aware about scope and opportunities in food processing sector.
**CO 2:** To make students aware of different functions of food.
**CO 3:** To make students aware about role of various food groups human diet.
**CO 4:** To make students understand the nutritive value of foods.
**CO 5:** To make student understand basic principles of cooking and its effect on different foods.
**CO 6:** To study about the composition of different food groups.
**CO 7:** To study about Toxins present in foods and its elimination.

## Topics and Learning Points

**Unit-1 Wheat and bakery ingredients, baking technology: 08P**
Variety, qualities, Types of Wheat, Grading system, Chemical constituents, physiological and rheological properties, Enzymes and wheat flour.

**Unit-2: Types & role of ingredients 07P**
Major and Minor ingredients and their functions in bakery products

**Unit-3 Bakery products and unit operations 09P**
The reactions of baking (Mixing, leavening, baking) preparation method of bread, cake, biscuits, cookies, pastry, buns, crackers, types of quick bread, Non-dairy creamer/toppings in bakery industries: source, method of preparations.

**Unit-4 Start-up projects 06P**
Bakery organization and start-up project in bakery industry.

## References:


- Morris B. Jacobs The chemical analysis of foods and food products, III Edition, CBS Publishers and distributors New Delhi.
- S. Ranganna, Hand book of analysis and quality control for fruit and vegetable products, II Ed., Tata McGraw Hill Publishing Co. New Delhi.
- D.T.Plummer An introduction to practical biochemistry, III Ed. Tata McGraw Hill Publishing Co. New Delhi
- Pomeranz Y., Meloan, Clifton E. 1994. Food Analysis: Theory and practice, 3rd Edn. IS: 6273 (Part-1& Part-2). Chapman and Hall. 8
- Hand Book of analysis and quality control for fruit and Vegetable Products". IInd edition. Tata McGraw-Hill Publishing Company Ltd. New Delhi.


**Mapping of Program Outcomes with Course Outcomes**

Class: FYMSc Subject: Bakery Technology
Course Type: Major Course Code: FTR-506-MJE(A)
Weightage: 0= No Relation, 1= Weak or low relation, 2= Moderate or partial relation, 3= Strong or direct relation

| CO/ PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | - | - | - | 2 | - | - | - | - | - | - | - |
| CO2 | 2 | - | - | 2 | 2 | - | 2 | - | - | 2 | - | 5 |
| CO3 | 2 | - | - | 6 | - | 6 | 2 | 2 | - | 4 | - | - |
| CO4 | 1 | 3 | 3 | 2 | - | 5 | - | - | - | 2 | - | - |
| CO5 | - | - | - | 6 | 6 | 5 | 4 | 2 | - | - | - | 2 |
| CO6 | 1 | - | 2 | 4 | 3 | 6 | 5 | - | - | 2 | 3 | - |
| CO7 | - | - | 3 | 6 | - | 7 | 5 | - | 2 | 4 | - | - |

## Justification for the mapping

**PO1:** Disciplinary knowledge-Understand the basic concepts, fundamental principles and experimental findings and the scientific theories related to food technology, food science and Food technology & engineering and its other fields related to the program.
**CO 1:** To make students aware about scope and opportunities in food processing sector.
**CO 2:** To make students aware of different functions of food.
**CO 3:** To make students aware about role of various food groups human diet.
**CO 4:** To make students understand the nutritive value of foods.
**CO 6:** To study about the composition of different food groups.

**PO2:**Communication Skills - Develop various communication skills such as reading, listening and speaking skills to express ideas and views clearly and effectively.
**CO 4:** To make students understand the nutritive value of foods.

**PO3:** Critical Thinking- Propose novel idea sin explaining the scientific data, facts and figures related to science and technology**.**
**CO 4:** To make students understand the nutritive value of foods.
**CO 6:** To study about the composition of different food groups.
**CO 7:** To study about Toxins present in foods and its elimination.

**PO4:** Analytical reasoning and problem solvingto unable the students with good scientific and engineering knowledge so as to comprehend, design and create food products and devices for food industry and provide solutions for the challenges in the food industry as well as in the agriculture.
**CO 2:** To make students aware of different functions of food.
**CO 3:** To make students aware about role of various food groups in human diet.
**CO 4:** To make students understand the nutritive value of foods.

**CO 5:** To make student understand basic principles of cooking and its effect on different foods.
**CO 6:** To study about the composition of different food groups.
**CO 7:** To study about Toxins present in foods and its elimination.

**PO5:**Sense of InquiryCuriously ask relevant questions for better understanding of fundamental concepts and principles, scientific theories and applications related to the study.
**CO 1:** To make students aware about scope and opportunities in food processing sector.
**CO 2:** To make students aware of different functions of food.
**CO 5:** To make student understand basic principles of cooking and its effect on different foods.
**CO 6:** To study about the composition of different food groups.

**PO6:** Use of modern tools operate modern tools, equipment, instrument and laboratory techniques to perform the experiments and write the programmes in the different languages.
**CO 3:** To make students aware about role of various food groups human diet.
**CO 4:** To make students understand the nutritive value of foods.
**CO 5:** To make student understand basic principles of cooking and its effect on different foods.
**CO 6:** To study about the composition of different food groups.

**PO7:** Research skills Understand how to design, collect, analyze, interpret and evaluate information/data that is relevant to food technology.
**CO 2:** To make students aware of different functions of food.
**CO 3:** To make students aware about role of various food groups in human diet.
**CO 5:** To make student understand basic principles of cooking and its effect on different foods.
**CO 6:** To study about the composition of different food groups.
**CO 7:** To study about Toxins present in foods and its elimination.

**PO8:** Application of knowledge develops a scientific outlook and applies the knowledge with respect to food technology.
**CO 3:** To make students aware about role of various food groups human diet.
**CO 5:** To make student understand basic principles of cooking and its effect on different foods.

**PSO9:** Ethical awareness to train students in professional and ethical attitude, effective communication skills, team work skills, and multidisciplinary approaches related to food technology and engineering.
**CO 7:** To study about Toxins present in foods and its elimination.

**PO10:** Team Work understand the basic concepts, fundamental principles and experimental findings and the scientific theories related to food technology, food science and food technology and engineering and its other fields related to the programme.
**CO 2:** To make students aware of different functions of food.
**CO 3:** To make students aware about role of various food groups in human diet.
**CO 4:** To make students understand the nutritive value of foods.
**CO 6:** To study about the composition of different food groups.
**CO 7:** To study about Toxins present in foods and its elimination.

**PO11:** Environmental sustainability Develop various communication skills such and reading, listening and speaking skills to express ideas and views clearly and effectively.
**CO 6:** To study about the composition of different food groups.

**PO12:** Lifelong learning Propose novel ideas in explain the scientific data, fact and figures related to science and technology.
**CO 2:** To make students aware of different functions of food.
**CO 5:** To make student understand basic principles of cooking and its effect on different foods.

## CBCS Syllabus as per NEP 2020 for F.Y MSc. Food Technology & Research (2025 Pattern)

**Name of the Programme** : M.Sc. Food Technology

**Programme Code** : FTR

**Class** : F.Y M.Sc.

**Semester** : **I**

**Course Code** : **FTR-506-MJE (B)**

**Course Type** : Major

**Course Title** : Confectionery Technology

**No. of Credits** : **02**

**No. of Teaching Hours** : **30**

### Course Objectives:

1. To learn about the scope of Food Preservation of India
2. To study the functions of food
3. To study about the Indian Standards & International Organization.
4. To learn about energy metabolism & balance diet

### Course Outcomes:

**CO1:** Students will get knowledge about the food science & technology.
**CO2:** Students will have a thorough understanding of Indian Standards & International

Organization.
**CO3:** The students will know the classification & health benefits of food.
**CO4:** Student will learn about the basic of nutrients.
**CO5:** Students will learn about various regulations related to food science.
**CO6:** Students will learn about various laws related to food science.
**CO7**: Students will get knowledge about food processing technology.

## Topics and Learning Points

**Unit-1: Introduction to confectionery** **08P**
History, traditional confectionery goods, types of confectionary, classification, invert sugar, glucose syrup, Manufacturing of food starches, heating of starch granules, gelatinization, retro gradation, factors affecting gelatinization.

**Unit-2: Sugar based** **07P**
Manufacturing of raw, refined and White sugar, forms of sugar, liquid sweeteners, reactions of sugar, crystalline and amorphous confectionery

**Unit-3 Chocolate based Confectionery** **08P**
Chocolate based confectionery: History and development, cocoa processes, cocoa butter, emulsifiers used in chocolate confectionery coatings and cocoa, chocolate manufacture, chocolate bars and covered confectionery

**Unit-4: Caramel, High boiled sweets, Toffee** **07P**
Definition, composition, caramel manufacture process, properties of high boiled sweets, preparation of high boiled sweets, types of toffee ingredient and their role, Fondant, Fudge preparation.

## References:


- Morris B. Jacobs The chemical analysis of foods and food products, III Edition, CBS Publishers and distributors New Delhi.
- S. Ranganna, Hand book of analysis and quality control for fruit and vegetable products, II Ed., Tata McGraw Hill Publishing Co. New Delhi.
- D.T.Plummer An introduction to practical biochemistry, III Ed. Tata McGraw Hill Publishing Co. New Delhi
- Pomeranz Y., Meloan, Clifton E. 1994. Food Analysis : Theory and practice, 3rd Edn. IS: 6273 (Part-1& Part-2). Chapman and Hall. 8
- Hand Book of analysis and quality control for fruit and Vegetable Products". IInd edition. Tata McGraw-Hill Publishing Company Ltd. New Delhi

## Mapping of Programme Outcomes with Course Outcomes

Class: FY MSc Subject: Confectioner Technology
Course Type: Major Course Code: FTR-506-MJE (B)
Weightage: 0= No Relation, 1= Weak or low relation, 2= Moderate or partial relation, 3= Strong or direct relation

| CO/ PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 6 | - | - | - | - | - | - | - | 2 | 2 | - | - |
| CO2 | - | - | 2 | 6 | 5 | 6 | 6 | - | - | - | - | 6 |
| CO3 | - | - | - | - | - | - | - | - | - | - | - | 2 |
| CO4 | - | 2 | - | - | 2 | - | - | 4 | - | - | 6 | - |
| CO5 | - | - | 2 | - | 2 | 2 | - | 2 | - | 2 | - | 6 |
| CO6 | 4 | - | - | - | 2 | - | - | - | 2 | 2 | - | 6 |
| CO7 | 2 | - | 1 | 4 | 2 | 6 | - | - | - | - | - | - |

## Justification for the mapping

**PO1:** Disciplinary knowledge- Understand the basic concepts, fundamental principles and experimental findings and the scientific theories related to food technology, food science and Food technology & engineering and its other fields related to the program.
**CO1:** Students will get knowledge about the food science & technology.
**CO6:** Students will learn about various laws related to food science.
CO7: Students will get knowledge about food processing technology.

**PO2:**Communication Skills - Develop various communication skills such as reading, listening and speaking skills to express ideas and views clearly and effectively.
**CO4:** Student will learn about the basic of nutrients.

**PO3** Critical Thinking- Propose novel idea sin explaining the scientific data, facts and figures related to science and technology**.**
**CO2:** Students will have a thorough understanding of Indian Standards & International Organization.
**CO5:** Students will learn about various regulations related to food science.
**CO7**: Students will get knowledge about food processing technology.

**PO4:** Analytical reasoning and problem solvingto unable the students with good scientific and engineering knowledge so as to comprehend, design and create food products and devices for food industry and provide solutions for the challenges in the food industry as well as in the agriculture.
**CO2:** Students will have a thorough understanding of Indian Standards & International Organization.

**CO7:** Students will get knowledge about food processing technology.

**PO5:**Sense of InquiryCuriously ask relevant questions for better understanding of fundamental concepts and principles, scientific theories and applications related to the study.
**CO2:** Students will have a thorough understanding of Indian Standards & International Organization.
**CO4:** Student will learn about the basic of nutrients.
**CO5:** Students will learn about various regulations related to food science.
**CO6:** Students will learn about various laws related to food science.
**CO7**: Students will get knowledge about food processing technology.

**PO6:** Use of modern tools operate modern tools, equipment, instrument and laboratory techniques to perform the experiments and write the programmes in the different languages.
**CO2:** Students will have a thorough understanding of Indian Standards & International Organization.
**CO5:** Students will learn about various regulations related to food science.
**CO7**: Students will get knowledge about food processing technology.

**PO7:** Research skills Understand how to design, collect, analyze, interpret and evaluate information/data that is relevant to food technology.
**CO2:** Students will have a thorough understanding of Indian Standards & International Organization.

**PO8:** Application of knowledge develop a scientific outlook and apply the knowledge with respect to food technology.
**CO4:** Student will learn about the basic of nutrients.
**CO5:** Students will learn about various regulations related to food science.

**PO9:** Ethical awareness to train students in professional and ethical attitude, effective communication skills, team work skills, and multidisciplinary approaches related to food technology and engineering.
**CO2:** Students will have a thorough understanding of Indian Standards & International Organization.
**CO6:** Students will learn about various laws related to food science.

**PO10:** Team Work understand the basic concepts, fundamental principles and experimental findings and the scientific theories related to food technology, food science and food technology and engineering and its other fields related to the programme.
**CO1:** Students will get knowledge about the food science & technology.
**CO5:** Students will learn about various regulations related to food science.
**CO6:** Students will learn about various laws related to food science.

**PO11:** Environmental sustainability Develop various communication skills such and reading, listening and speaking skills to express ideas and views clearly and effectively.
**CO4:** Student will learn about the basic of nutrients.

**PO12:** Lifelong learning Propose novel ideas in explain the scientific data, fact and figures related to science and technology.
**CO2:** Students will have a thorough understanding of Indian Standards & International Organization.
**CO3:** The students will know the classification & health benefits of food.
**CO5:** Students will learn about various regulations related to food science.
**CO6:** Students will learn about various laws related to food science.

## CBCS Syllabus as per NEP 2020 for F.Y MSc. Food Technology & Research (2025 Pattern)

**Name of the Programme** : M.Sc. Food Technology

**Programme Code** : FTR

**Class** : F.Y M.Sc.

**Semester** : **I**

**Course Code** : **FTR-507-MJE (A)**

**Course Type** : Major

**Course Title** : Practical of Bakery Technology

**No. of Credits** : **02**

**No. of Teaching Hours** : **30**

## Course Objectives:

1 To make students aware about importance of presentation skills in food processing sector.
2 To make students aware about various equipments in artistic presentation of foods and their handling.
3 To make students aware about various utensils in artistic presentation of foods and their handling.
4 To make various products with different colours and shape to increase its attractiveness.
5 To make students prepare various desserts with attractive shape and colour.
6 To make students prepare various healthy and colourful soups.
7 To enhance students fruits and vegetable carving skills.

## Course Outcomes:

**CO1:** To make students aware about importance of presentation skills in food processing sector.
**CO2:**To make students aware about various equipments in artistic presentation of foods and their handling.
**CO3:**To make students aware about various utensils in artistic presentation of foods and their handling.
**CO4:**To make various products with different colours and shape to increase its attractiveness.
**CO5:** To make students prepare various desserts with attractive shape and colour.
**CO6:** To make students prepare various healthy and colorful soups
**CO7:** To enhance student's fruits and vegetable carving skills

## Topics and Learning Points

| Sr. No. | Practical Name | Periods |
|---|---|---|
| **1.** | Classification of wheat based on physico-chemical properties | **1P** |
| **2.** | Quality testing of flour and yeast | **3P** |
| **3.** | Preparation of cookies & evaluation of physical properties | **4P** |
| **4.** | Preparation of biscuit | **4P** |
| **5.** | Preparation of bread and evaluation of quality parameters | **4P** |
| **6.** | Preparation of Cream roll | **4P** |
| **7.** | Preparation of chocolate muffins | **4P** |
| **8.** | Preparation of Buns | **4P** |
| **9.** | Preparation of sponge cake | **3P** |
| **10.** | Preparation of Pastry | **3P** |
| **11.** | Preparation of breadsticks | **3P** |
| **12.** | Preparation of chocolate mousse | **3P** |
| **13.** | Preparation of lava cake | **3P** |
| **14.** | Visit to bakery industry | **3P** |
| **15.** | Preparation of report | **2P** |

## References:


- Matz S. A. (1996): Bakery technology and engineering, 1st edition, Arya book depot New delhi.
- Practical Baking Cooking, 1st edition, Queen street house, U.K.
- Kamel B. S. and Stauffer C. E. (1993): Advances in baking technology, 1st edition, Blackie academic and professional.
- Aylwaed F. (2001): Food Technology Processing and Quality control \, 1st
- edition, Agrobios (India)
- Khetarpaul N, Grewal R. B. and Jood S. (2005): Bakery Science and Cereal Technology, 1st edition, Daya publishing house, Delhi.

- Minife B.W. (1997): Chocolate, cocoa and confectionery science and technology, 3rd edition, CBS Publishers and Distributors, New Delhi.


**Mapping of Program Outcomes with Course Outcomes**

Class: FYMSc Subject: Practical of Bakery Technology
Course Type: Major Course Code: FTR-507-MJE(B)
Weightage: 0= No Relation, 1= Weak or low relation, 2= Moderate or partial relation, 3= Strong or direct relation

| CO/ PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | - | - | - | 2 | - | - | - | - | - | - | - |
| CO2 | 2 | - | - | 2 | 2 | - | 2 | - | - | 2 | - | 5 |
| CO3 | 2 | - | - | 6 | - | 6 | 2 | 2 | - | 4 | - | - |
| CO4 | 1 | 3 | 3 | 2 | - | 5 | - | - | - | 2 | - | - |
| CO5 | - | - | - | 6 | 6 | 5 | 4 | 2 | - | - | - | 2 |
| CO6 | 1 | - | 2 | 4 | 3 | 6 | 5 | - | - | 2 | 3 | - |
| CO7 | - | - | 3 | 6 | - | 7 | 5 | - | 2 | 4 | - | - |

**Justification for the mapping**

**PO1:** Disciplinary knowledge-Understand the basic concepts, fundamental principles and experimental findings and the scientific theories related to food technology, food science and Food technology & engineering and its other fields related to the program.
**CO1:** To make students aware about importance of presentation skills in food processing sector.
**CO2:**To make students aware about various equipments in artistic presentation of foods and their handling.
**CO3:** To make students aware about various utensils in artistic presentation of foods and their handling.
**CO4:**To make various products with different colours and shape to increase its attractiveness.

**PO2:**Communication Skills - Develop various communication skills such as reading, listening and speaking skills to express ideas and views clearly and effectively.
**CO4:**To make various products with different colours and shape to increase its attractiveness.

**PO3:** Critical Thinking- Propose novel idea sin explaining the scientific data, facts and figures related to science and technology**.**
**CO4:**To make various products with different colours and shape to increase its attractiveness.
**CO6:** To make students prepare various healthy and colourful soups
**CO7:** To enhance students fruits and vegetable carving skills.

**PO4:** Analytical reasoning and problem solvingTo unable the students with good scientific and engineering knowledge so as to comprehend, design and create food products and devices for food industry and provide solutions for the challenges in the food industry as well as in the agriculture.

**CO2:**To make students aware about various equipments in artistic presentation of foods and their handling.
**CO3:** To make students aware about various utensils in artistic presentation of foods and their handling.
**CO4:**To make various products with different colours and shape to increase its attractiveness.
**CO5:** To make students prepare various desserts with attractive shape and colour.
**CO6:** To make students prepare various healthy and colourful soups
**CO7:** To enhance students fruits and vegetable carving skills.

**PO5:**Sense of InquiryCuriously ask relevant questions for better understanding of fundamental concepts and principles, scientific theories and applications related to the study.
**CO1:** To make students aware about importance of presentation skills in food processing sector.
**CO2:**To make students aware about various equipments in artistic presentation of foods and their handling.
**CO5:** To make students prepare various desserts with attractive shape and colour.
**CO6:** To make students prepare various healthy and colourful soups

**PO6:** Use of modern tools operate modern tools, equipment, instrument and laboratory techniques to perform the experiments and write the programmes in the different languages.
**CO3:** To make students aware about various utensils in artistic presentation of foods and their handling.
**CO4:**To make various products with different colours and shape to increase its attractiveness.
**CO5:** To make students prepare various desserts with attractive shape and colour.
**CO6:** To make students prepare various healthy and colourful soups
**CO7:** To enhance students fruits and vegetable carving skills.

**PO7:** Research skills Understand how to design, collect, analyze, interpret and evaluate information/data that is relevant to food technology.
**CO2:**To make students aware about various equipments in artistic presentation of foods and their handling.
**CO3:** To make students aware about various utensils in artistic presentation of foods and their handling.
**CO5:** To make students prepare various desserts with attractive shape and colour.
**CO6:** To make students prepare various healthy and colourful soups
**CO7:** To enhance students fruits and vegetable carving skills.

**PO8**:Application of knowledge Develop a scientific outlook and apply the knowledge with respect to food technology.
**CO3:** To make students aware about various utensils in artistic presentation of foods and their handling.
**CO5:** To make students prepare various desserts with attractive shape and colour.

**PO9:** Ethical awareness to train students in professional and ethical attitude, effective communication skills, team work skills, and multidisciplinary approaches related to food technology and engineering.

**CO7:** To enhance students fruits and vegetable carving skills.

**PO10:** Team Work understand the basic concepts, fundamental principles and experimental findings and the scientific theories related to food technology, food science and food technology and engineering and its other fields related to the programme.
**CO2:**To make students aware about various equipments in artistic presentation of foods and their handling.
**CO3:** To make students aware about various utensils in artistic presentation of foods and their handling.
**CO4:**To make various products with different colours and shape to increase its attractiveness.
**CO6:** To make students prepare various healthy and colorful soups
**CO7:** To enhance students fruits and vegetable carving skills.

**PO11:** Environmental sustainability Develop various communication skills such and reading, listening and speaking skills to express ideas and views clearly and effectively.
**CO6:** To make students prepare various healthy and colorful soups.

**PO12:** Lifelong learning Propose novel ideas in explain the scientific data, fact and figures related to science and technology.
**CO2:**To make students aware about various equipments in artistic presentation of foods and their handling.
**CO5:** To make students prepare various desserts with attractive shape and colour.

## CBCS Syllabus as per NEP 2020 for F.Y MSc. Food Technology & Research (2025 Pattern)

**Name of the Programme** **:** M.Sc. Food Technology

**Programme Code** **:** FTR

**Class** **:** F.Y M.Sc.

**Semester** **: I**

**Course Code** **: FTR-507-MJE (B)**

**Course Type** **:** Major

**Course Title** **:** Practical of Confectionery Technology

**No. of Credits** **: 02**

**No. of Teaching Hours** **: 30**

## Course Objectives:

1 To make students aware about importance of presentation skills in food processing sector.
2 To make students aware about various equipments in artistic presentation of foods and their handling.
3 To make students aware about various utensils in artistic presentation of foods and their handling.
4 To make various products with different colours and shape to increase its attractiveness.
5 To make students prepare various desserts with attractive shape and colour.
6 To make students prepare various healthy and colourful soups.
7 To enhance students fruits and vegetable carving skills.

## Course Outcomes:

**CO1:** To make students aware about importance of presentation skills in food processing sector.
**CO2:**To make students aware about various equipments in artistic presentation of foods and their handling.
**CO3:** To make students aware about various utensils in artistic presentation of foods and their handling.
**CO4:**To make various products with different colours and shape to increase its attractiveness.
**CO5:** To make students prepare various desserts with attractive shape and colour.
**CO6:** To make students prepare various healthy and colorful soups
**CO7:** To enhance student's fruits and vegetable carving skills.

## Topics and Learning Points

| Sr. No. | Practical Name | Periods |
|---|---|---|
| **1.** | Preparation of high boiled sweets | **2P** |
| **2.** | Preparation of chocolates | **3P** |
| **3.** | Preparation of Fondant | **4P** |
| **4.** | Preparation of groundnut chikki | **4P** |
| **5.** | Preparation of milk chocolate | **4P** |
| **6.** | Preparation of toffee | **2P** |
| **7.** | Preparation of jelly candy | **4P** |
| **8.** | Preparation of Marshmallow | **4P** |
| **9.** | Preparation of Taffy or chews | **3P** |
| **10.** | Preparation of Mysure Pak | **3P** |
| **11.** | Preparation of Fudge | **3P** |
| **12.** | Preparation of Son Papdi | **3P** |
| **13.** | Preparation of Petha | **4P** |
| **14.** | Visit to Confectionary industry and Preparation of report | **3P** |

| | | |
|---|---|---|
| **15.** | Preparation of report | **2P** |

## References:


- Matz S. A. (1996): Bakery technology & engg, 1st edition, Arya book depo New delhi.
- Practical Baking Cooking, 1st edition, Queen street house, U.K.
- Kamel B. S. and Stauffer C. E. (1993): Advances in baking technology, 1st edition, Blackie academic and professional.
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### Mapping of Program Outcomes with Course Outcomes

Class: FYMSc Subject: Practical of Confectionery Technology

Course Type: Major Course Code: FTR-507-MJE(B)

Weightage: 0= No Relation, 1= Weak or low relation, 2= Moderate or partial relation, 3= Strong or direct relation

| CO/ PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | **3** | **-** | **-** | **-** | **2** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |
| **CO2** | **2** | **-** | **-** | **2** | **2** | **-** | **2** | **-** | **-** | **2** | **-** | **5** |
| **CO3** | **2** | **-** | **-** | **6** | **-** | **6** | **2** | **2** | **-** | **4** | **-** | **-** |
| **CO4** | **1** | **3** | **3** | **2** | **-** | **5** | **-** | **-** | **-** | **2** | **-** | **-** |
| **CO5** | **-** | **-** | **-** | **6** | **6** | **5** | **4** | **2** | **-** | **-** | **-** | **2** |
| **CO6** | **1** | **-** | **2** | **4** | **3** | **6** | **5** | **-** | **-** | **2** | **3** | **-** |
| **CO7** | **-** | **-** | **3** | **6** | **-** | **7** | **5** | **-** | **2** | **4** | **-** | **-** |

### Justification for the mapping

**PO1:** Disciplinary knowledge-Understand the basic concepts, fundamental principles and experimental findings and the scientific theories related to food technology, food science and Food technology & engineering and its other fields related to the program.

**CO1:** To make students aware about importance of presentation skills in food processing sector.

**CO2:**To make students aware about various equipments in artistic presentation of foods and their handling.

**CO3:** To make students aware about various utensils in artistic presentation of foods and their handling.

**CO4:**To make various products with different colours and shape to increase its attractiveness.

**PO2:**Communication Skills - Develop various communication skills such as reading, listening and speaking skills to express ideas and views clearly and effectively.
**CO4:**To make various products with different colours and shape to increase its attractiveness.

**PO3:** Critical Thinking- Propose novel idea sin explaining the scientific data, facts and figures related to science and technology**.**
**CO4:**To make various products with different colours and shape to increase its attractiveness.
**CO6:** To make students prepare various healthy and colourful soups
**CO7:** To enhance students fruits and vegetable carving skills.

**PO4:** Analytical reasoning and problem solvingTo unable the students with good scientific and engineering knowledge so as to comprehend, design and create food products and devices for food industry and provide solutions for the challenges in the food industry as well as in the agriculture.
**CO2:**To make students aware about various equipments in artistic presentation of foods and their handling.
**CO3:** To make students aware about various utensils in artistic presentation of foods and their handling.
**CO4:**To make various products with different colours and shape to increase its attractiveness.
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**CO6:** To make students prepare various healthy and colourful soups
**CO7:** To enhance students fruits and vegetable carving skills.

**PO5:**Sense of InquiryCuriously ask relevant questions for better understanding of fundamental concepts and principles, scientific theories and applications related to the study.
**CO1:** To make students aware about importance of presentation skills in food processing sector.
**CO2:**To make students aware about various equipments in artistic presentation of foods and their handling.
**CO5:** To make students prepare various desserts with attractive shape and colour.
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**PO6:** Use of modern tools operate modern tools, equipment, instrument and laboratory techniques to perform the experiments and write the programmes in the different languages.
**CO3:** To make students aware about various utensils in artistic presentation of foods and their handling.
**CO4:**To make various products with different colours and shape to increase its attractiveness.
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**PO7:** Research skills Understand how to design, collect, analyze, interpret and evaluate information/data that is relevant to food technology.
**CO2:**To make students aware about various equipments in artistic presentation of foods and their handling.
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**PO9:** Ethical awareness to train students in professional and ethical attitude, effective communication skills, team work skills, and multidisciplinary approaches related to food technology and engineering.
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**PO11:** Environmental sustainability Develop various communication skills such and reading, listening and speaking skills to express ideas and views clearly and effectively.
**CO6:** To make students prepare various healthy and colorful soups.

**PO12:** Lifelong learning Propose novel ideas in explain the scientific data, fact and figures related to science and technology.
**CO2:**To make students aware about various equipments in artistic presentation of foods and their handling.
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## CBCS Syllabus as per NEP 2020 for F.Y MSc. Food Technology & Research (2025 Pattern)

**Name of the Programme** **:** M.Sc. Food Technology

**Programme Code** **:** FTR

**Class** : F.Y M.Sc.

**Semester** : I

**Course Code** : **FTR-508-RM**

**Course Type** : Major

**Course Title** : Research Methodology

**No. of Credits** : **02**

**No. of Teaching Hours** : **30**

## Course Objectives:

8 To make students aware about importance of presentation skills in food processing sector.
9 To make students aware about various equipments in artistic presentation of foods and their handling.
10 To make students aware about various utensils in artistic presentation of foods and their handling.
11 To make various products with different colours and shape to increase its attractiveness.
12 To make students prepare various desserts with attractive shape and colour.
13 To make students prepare various healthy and colourful soups.
14 To enhance students fruits and vegetable carving skills.

## Course Outcomes:

**CO1:** To make students aware about importance of presentation skills in food processing sector.
**CO2:**To make students aware about various equipments in artistic presentation of foods and their handling.
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**CO7:** To enhance student's fruits and vegetable carving skills.

## Topics and Learning Points

**Module-1: Introduction of Research Design** **10P**

Steps in the Process of Research

Identifying a hypothesis and/or research problem, specifying a purpose, creating research

questions, Reviewing literature, Ethics of research and informed consent

**Module II: Introduction to Qualitative Research** **10P**
Essence of Qualitative data, Data Sampling and Collection Techniques

**Module III: Introduction to Quantitative Research** **12 P**
Essence of Quantitative Data and Collection and Analysis Techniques

**Module IV: Interpreting Qualitative Data** **08 P**
Qualitative Data Analysis Procedures, Coding and Thematic development

**Module V: Preparation of Research article** **08 P**
Use of techniques and writing about findings, Review paper, Research paper, article etc.

**Module VI: Intellectual property rights (IPRs)** **12P**
Concept of IP and IPR; Patents; Copyright; Industrial designs; Trade secrets; Ethics in publication; Plagiarism and open access publishing

**References:**


- John Creswell Research Design: Qualitative, Quantitative, and Mixed Methods Approaches


**Mapping of Program Outcomes with Course Outcomes**

Class: FYMSc Subject: Research Methodology
Course Type: Major Course Code: FTR-508-RM
Weightage: 0= No Relation, 1= Weak or low relation, 2= Moderate or partial relation, 3= Strong or direct relation

| CO/ PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | - | - | - | 2 | - | - | - | - | - | - | - |
| CO2 | 2 | - | - | 2 | 2 | - | 2 | - | - | 2 | - | 5 |
| CO3 | 2 | - | - | 6 | - | 6 | 2 | 2 | - | 4 | - | - |
| CO4 | 1 | 3 | 3 | 2 | - | 5 | - | - | - | 2 | - | - |
| CO5 | - | - | - | 6 | 6 | 5 | 4 | 2 | - | - | - | 2 |
| CO6 | 1 | - | 2 | 4 | 3 | 6 | 5 | - | - | 2 | 3 | - |
| CO7 | - | - | 3 | 6 | - | 7 | 5 | - | 2 | 4 | - | - |

**Justification for the mapping**

**PO1:** Disciplinary knowledge-Understand the basic concepts, fundamental principles and experimental findings and the scientific theories related to food technology, food science and Food technology & engineering and its other fields related to the program.

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**PO2:**Communication Skills - Develop various communication skills such as reading, listening and speaking skills to express ideas and views clearly and effectively.
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**PO3:** Critical Thinking- Propose novel idea sin explaining the scientific data, facts and figures related to science and technology**.**
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**PO4:** Analytical reasoning and problem solvingTo unable the students with good scientific and engineering knowledge so as to comprehend, design and create food products and devices for food industry and provide solutions for the challenges in the food industry as well as in the agriculture.
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