Shivaji University, Kolhapur

Department of Technology

Vision
To be a leader in engineering and technology education, a research centre of global standards to provide valuable resources for industry and society through development of competent technical human resources.
Mission
1. To develop technocrats of national & international stature committed to the task of nation building. 2. To organize teaching learning programs to facilitate the development of competent and committed professionals for practice, research and academics. 3. To undertake collaborative research projects that offer opportunities for consistent interaction with industries.

Name of Programme: M.Tech. (Food Technology)

Program Outcomes
PO1 Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. PO2 Problem Analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. PO3 Design/development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet t h e specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental

considerations

PO4 Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5 Modern Tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6 The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7 Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8 Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9 Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10 Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12 Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes

PSO 1
Students will have knowledge on the fundamentals of food science and nutrition, food chemistry and biochemical changes during processing and preservation, nutraceuticals, also students will be able to understand and apply sensory evaluation of food.

PSO 2
Students will be able to understand the principles behind analytical techniques used in evaluating the biochemical properties of food; they will be above to identify the microorganism responsible for food spoilage and the methods to control the food spoilage

PSO 3
Students will demonstrate knowledge in various engineering properties of food and its application in food industry, concept of mass balance and energy balance, unit operations in food processing, conventional and advanced methods of food preservation, methods of packing, post-harvest practices so as to develop food products and develop device for food industry.

Course Outcomes		
Part-I Semester-I		
Course code 68096	Course title Research Methodology(Audit)	1.Students will be acquainted with the principles and methods of scientific research 2.Students will be familiarized with statistical methods for data analysis 3.Students will develop scientific writing skills
Course code 68097	Course title Advances in Food Engg. And Technology	1.To improve the students' understanding of mass and energy as a basis in food engineering analysis to develop various food products 2.To develop the capacity of students to integrate knowledge and to analyses, evaluate and manage specific processing technologies used for various food products 3. To impart the knowledge of new technologies with its principles, applications in the field of food engineeringto students 4.To improve the ability of students to design the food processing equipment used for the different unit operations 5. To make the students to identify and solve problem related to Food Engineering
Course code 68098	Course title Advances in Food Science and Nutrition	1.Students will be able to understand the chemistry of carbohydrate, protein and lipid. 2.Students will be able to understand the chemistry of water, vitamins and minerals. 3.Students will be able to understand physiological importance of nutrients. 4. Student will be able to learn the various nutraceutical aspects of food 5. Students will be able to understand the principles behind analytical techniques associated with food components and related problems. 6.Student will become practical proficient in a food analysis laboratory.
Course code 68099	Course title Novel Techniques in Food Packaging	1.Describe the role and function of packaging materials used for a range of consumer food needs and wants 2. Design solutions to packaging problems. 3. Relate the properties of food packages to conversion technologies, processing and packaging technologies and user requirements including safety, convenience and environmental issues. 4. Measure and evaluate the chemical, physical and mechanical properties of packages and packaging.

		5.Analyse the principles and practices of laminates, active packaging materials and edible films. 6. Describe the technology involved in the production, shaping and printing of various packaging materials and packages
Course code 68106	Course title Laboratory- I Advances in Food Engg.And Technology	1.To improve the students' understanding of mass and energy as a basis in food engineering analysis to develop various food products 2. To develop the capacity of students to integrate knowledge and to analyse, evaluate and manage specific processing technologies used for various food products 3. To impart the knowledge of new technologies with its principles, applications in the field of food engineering to students 4. To improve the ability of students to design the food processing equipments used for the different unit operations 5. To make the students to identify and solve problem related to Food Engineering
Course code 68107	Course title Laboratory-II Advances Food Scienceand Nutrition	1. Students will be able to understand the chemistry of carbohydrate, protein and lipid. 2. Students will be able to understand the chemistry of water, vitamins and minerals. 3. Students will be able to understand physiological importance of nutrients. 4. Student will be able to practically learn the various nutraceutical aspects of food. 5. Students will be able to understand the analytical techniques associated with food components and related problems. 6. Student will become practical proficient in a food analysis laboratory.
Course code 68108	Course title Laboratory-III Novel Techniques inFood Packaging	1.The students will able to get experience on testing food packaging materials to assure quality of foods. 2. Understand different types of food packaging materials. 3. Aware of symbols used in food industries. 4. Understand the role and effectiveness of various packaging systems. 5.Shelf life evaluation of packaged foods 6. Student will become practical proficient in a food packaging materials
Course code 68109	Course title Seminar-I	1. Students are made conversant with the present advancement and trend of technology in food process

		industry adaptation of processes developed in academic institutions and research laboratories. 2. Increased knowledge of current research activity in areas of specific student interest as well as across the spectrum of food technology activity Enhanced information literacy 3. Development of safe laboratory work practices 4. Enhanced knowledge of professional ethics and entrepreneurial skills
Course code. 68101	Course title Elective-9 (Modern techniques in fruits and vegetable processing)	1.Understand technologies of post-harvest technology and its role in providing better quality produce to the consumer 2. Students would have learnt different post harvest handling methods of fruits and vegetables. 3. The students will have knowledge about different processing and preservation methods fruits and vegetables. 4. Have detailed knowledge of the chemical, biological and nutritional properties of fruits and vegetables. 5. Have detailed knowledge of the effects of processing on product quality 6. Learn quality control and various standards required for domestic and export market
Course code 68103	Course title Elective-II (Advances in processing of dairy technology)	1. Students will be able to describe the composition of milk, identify the approximate content of individual types present, and describe physicochemical characteristics of the main components. 2. Students will integrate their knowledge of food chemistry/engineering/microbiology and physical properties of foods to understand the processing of dairy products 3. Student will be able to explain how dairy products are made and the key functions of the processing steps involved 4. Students will be able to use their knowledge of the chemistry of dairy components to evaluate the impact of processing conditions on milk and dairy products 5. Students will be able to conduct independent library research on current topics of importance to the dairy industry 6. Describe the technology involved in the production, shaping and printing of various packaging of dairy product.

Part-I Semester-II		
Course code 68248	Course title Advances in Food Biotechnology	1.Analyse the importance of microorganisms in foods and understand the biotic and abiotic factors that affect their development in these substrates 2.Analyse, summarise, resolve problems and make professional decisions 3. Apply the scientific method to resolving problems. 4. Design experiments and interpret the results 5. Develop individual learning strategies and planning and organisation skills. 6. Evaluate the behaviour of reactors depending on their operating mode.
Course code 68249	Course title Chemical and instrumental analysis of food components	1.Students will be able to understand the principle for determinations of Proximate composition: Moisture, Fat, Protein, Fiber, Carbohydrate, Ash etc. 2. Students will be able to learn principles for determination of Starch, Reducing and Non reducing sugars in foods, and Minerals etc. 3. Students will become practical proficient in sensory evaluation, analysis of fats and oil and blanching adequacy etc. 4. Students will learn the automation analysis techniques and use of computers in food analysis 5.Students will be able to understand the principles of modern food analysis techniques including spectroscopy ,flame photometry, X-ray analysis, electrophoresis, Mass spectroscopy, IR, Nuclear magnetic resonance etc. 6. Student will become practical proficient in Chromatography ,rheology measurement techniques, DSC, SEM and thermal analysis etc.
Course code 68250	Course title Food Quality, Safety andToxicology	1.Understand the objectives, importance, responsibilities and functions of quality control 2. Students would have learnt different Food Quality and Safety Management Systems 3. The students will have knowledge about quality specifications, quality assurance various local and global food standards 4. Have detailed knowledge of food toxicology and foodborne illness 5. Have detailed knowledge of food ingredients & food additives and their application in product development 6. Learn about Organic food and Genetically Modified Foods

Course code 68257	Course title Laboratory- I Advances in FoodBiotechnology	1. Students will be able to experiment with and observe the outcomes of biotechnological techniques propagated in food industries 2. Students will be provided a practical understanding of industrial food waste management processes 3. Students will be familiar with the isolation of various food resources 4.Students will be familiar with the practical aspects of toxin-free foods 5. Students will be scientific method to resolving problems 6 To become practical proficient in a food biotechnology laboratory. .
Course code 68258	Course title Laboratory-II Chemical andinstrumental analysis of foodcomponents	1. Students should be able to: State the main properties of the major food components (proteins, lipids, carbohydrates, water) and describe the effects of storage and common food processing operations on them. 2. Students should be able to: Describe and differentiate how the reactive groups of food components play an important role in chemical reactions. 3. Students should be able to Describe selected permitted food additives and discuss their impact on food quality and/or safety. 4. Students should be able to Describe selected analytical techniques and discuss their application for analysis of foods and food composition. 5. Understand the students perform laboratory procedures to analyse selected food components to obtain reliable data. 6. Understand the students write reports summarizing and evaluating experimental data related to the chemical analysis of foods.
Course code 68259	Course title Laboratory-III Food Quality,Safety and Toxicology	1. students will able to develop a HACCP plans for different food industries 2. Understanding and knowledge of HACCP certification 3. Understanding of laws and regulations governing food safety principles (FSMS and HACCP) 4. Understanding of industry food safety requirements and certifications :organic,halal, kosher, GFSI, SQF (SQF implementation certification) 5. Understanding of auditing and different auditing schemes, and be able to complete internal (first party)

		audits 6. students will able to analyse quality of food product
Course code 68260	Course title Seminar-II	1. Learn about various approaches in the field of food technology. 2. Explore various aspects related to food processing 3. Students will be able to development of safe laboratory work practices 4. Develop preliminary research proposalin the field of food technology
Course code 68251	Course title Elective-IIINewer developments in bakery andconfectionery	1. Students will have the fundamental knowledge of bakery products 2. Students will have the knowledge of different functional properties of the ingredients and processes of different bakery products 3. Students will have the ability to understand the working of various machineries used for the development of bakery products 4. Students will have the fundamental knowledge of confectionary products 5. Students will have the knowledge of different functional properties of the ingredients and processes of different confectionary products 6. To improve the ability of students to understand the working of various machineries used for the development of confectionary products
Course code 68252	Course title Elective-IV Recent developments in processing ofplantation crops	1. Understand the need of Spice and Condiments processing. 2. Understand the Classification of the spices and Herbs 3. Understand the different Techniques used for extraction of functional ingredients from Spices and Herbs 4. Identify the major and minor constituents of food and the chemical reactions in which they participate. 5. Describe the principals involved in the processing of the major types of spices and Herbs products. 6. Understand the students to processing and packaging technique of plantation crops.
Part-II Semester-III		
Course code 70774	Course title Industrial Training	1. Capability to acquire and apply fundamental principles of engineering 2. To understand the process control, sampling methods, and quality control applied /used in food industry 3. Knack to be a multi-skilled engineer with good

		technical knowledge, management, leadership and entrepreneurship skills. 4. To be aware of food safety management systems and updated Food regulations 5. Awareness of the social, cultural, global and environmental responsibility as an engineer. 6. Become updated with all the latest changes in technological world.
Course code 70775	Course title Dissertation Phase – I	1. Students will be able to explore, independently, topics of research importance related to the food industry 2. Students will be empowered to design a research study based on the principles of scientific research 3. Manage your time effectively whilst working on your independent research. 4. Students will be trained in interpreting collated data related to a topic of study 5. Students will be trained in analyzing collated data related to a research topic 6. Identify key research questions within the field of Demography on which you will carry out independent research
Part-II semester-IV		
Course code 70799	Course titleDissertation Phase – II	1. Identify, summarise and critically evaluate relevant literature and write a literature review of the relevant field. 2. Identify, analyse and interpret suitable data to enable the research question to be answered. 3. Understand and apply theoretical frameworks to the chosen area of study. 4.Analyse and synthesise research findings. 5. Students will be knowledge and understanding skills of scientific report writing. 6. Students will be endowed with skills required for publication