Semester IV

FT23123CR

Project Work (0+0+14)

Project work is a fundamental component of the masters program, allowing students to apply their knowledge and skills to real-world challenges in the food industry. Through research projects, students have the opportunity to explore specific areas of interest within food science and technology. These projects encourage critical thinking, problem-solving, and innovation, and often lead to valuable contributions to the field.

FT23124DCE

Credit Seminar (2+0+0)

Credit seminars provide a platform for students to enhance their communication and presentation skills. They are required to present their research findings, insights, and ideas to their peers and faculty members. These seminars foster collaboration, discussion, and constructive feedback, contributing to the overall professional development of the students.

FT23125DCE

Industrial visit (0+0+6)

Industrial visits are an integral part of the program, offering students a firsthand look at the food industry's operations and practices. These visits provide a unique opportunity to connect theory with industry realities. Students gain insights into food processing facilities, quality control measures, and emerging technologies. They also have the chance to interact with industry professionals, expanding their network and understanding of career opportunities in the field.

Significance of Project Work, Credit Seminars, and Industrial Visits:

Application of Knowledge: Project work allows students to apply the theoretical knowledge gained during coursework to real-world problems, bridging the gap between academia and industry.

Communication Skills: Credit seminars hone students' presentation and communication skills, essential for sharing research findings and ideas effectively.

Industry Exposure: Industrial visits offer invaluable exposure to industry practices, helping students understand the complexities and challenges of the food industry.

Networking: Interactions with industry professionals during industrial visits and project collaborations create networking opportunities and enhance students' career prospects.

Professional Development: These components collectively contribute to the holistic professional development of students, preparing them to become competent and innovative food scientists and technologists.

FT23007GE

Bakery Science (1+1+0)

Course description

The course "Bakery Science" is designed as an elective for students with non-food science backgrounds who are interested in gaining knowledge and skills related to bakery and confectionery products. This course provides a comprehensive overview of the science and technology behind baking, including the structure of grains, milling processes, raw materials used in bakery products, and the basics of bread, cookie, biscuit, and cake manufacturing. Through lectures and tutorials, students will learn about the history of baking, the chemistry of wheat proteins, the use of enzymes in the baking industry, common bread faults, and the development of health-promoting bread varieties enriched with specific nutrients.

Unit I:

- Structure and morphology of grain; Classification of wheat
- Milling, aims and principle of milling, steps of milling, milling machinery
- Raw materials used in bakery and their role in the product: Flour, yeast, fat, sugar, baking powder, egg, salt etc.
- Dough rheology and its measurement
- Basics of bread making: Basic bread recipe, flour characteristics and improvement, steps in bread making process, Charley-wood bread making process.
- Manufacturing cookies, biscuits and cakes, icings and toppings

Learning outcomes:

- Understand the structure and morphology of grains, with a focus on wheat.
- Classify different types of wheat and recognize their characteristics.
- Explain the aims and principles of milling and describe the steps involved in the milling process.
- Identify and understand the role of various raw materials used in baking, including flour, yeast, fat, sugar, baking powder, egg, and salt.
- Explore the rheology of dough and learn methods for its measurement.

- Gain insights into the basics of bread making, including the bread-making process, flour characteristics, and improvement techniques.
- Examine the Charley-wood bread-making process.
- Learn the manufacturing processes for cookies, biscuits, cakes, as well as icings and toppings.

Unit II: (Tutorials)

- History of bakery and confectionary
- Wheat proteins- chemistry, properties and their role in baked products
- Enzymes used in baking industry
- Bread faults and their remedies
- Breads enriched with health promoting components- high fiber breads, omega-3-fatty acid enriched breads, composite breads.

Learning outcomes:

- Explore the history of bakery and confectionery, tracing the evolution of these industries.
- Study the chemistry and properties of wheat proteins and their significance in baked products.
- Understand the role of enzymes used in the baking industry, including their functions and applications.
- Identify common bread faults and learn remedies to address them.
- Examine the development of specialty bread varieties enriched with health-promoting components, such as high-fiber breads, omega-3 fatty acid-enriched breads, and composite breads.

References:

1. Wheat chemistry and technology, Volume-I by Y. Pomeranz.
2. Cereals and cereal products by D. A. V. Dendy and B. J. Dobraszczyk.
3. Cereal processing technology by G. Owens.

4. Baking science and technology: fundamentals and ingredients by E. J. Pyler and L. A. Gorton.
5. Bread Science: The Chemistry and Craft of Making Bread by Emily Buehler.

FT23008OE

Post Harvest Physiology of Fruits & Vegetables (2+0+0)

Course Description:

The course "Post Harvest Physiology of Fruits & Vegetables" is tailored for students with non-food science backgrounds who wish to gain a comprehensive understanding of the physiological processes and factors affecting the post-harvest quality and storage of fruits and vegetables. This course covers fundamental concepts related to plant cell structure, post-harvest physiology, fruit classification, maturity indices, and the role of ethylene in ripening. Students will also delve into the enzymes and compounds associated with textural changes, post-harvest disorders, the influence of minerals, storage atmospheres, and management strategies to reduce post-harvest losses.

Unit I

- Cell and its structure with special reference to plant cell.
- Introduction to post harvest physiology of fruits and vegetables.
- Classification of fruits based on post harvest considerations.
- Fruit maturity and ripening; Maturity indices.
- Ethylene biosynthesis, regulation and mode of action. Factors affecting ethylene production.
- Water loss during fruit storage, factors affecting water loss, control of water loss.

Learning outcomes:

- Understand the structure of plant cells and their relevance to post-harvest physiology.
- Explore the introductory concepts of post-harvest physiology concerning fruits and vegetables.
- Classify fruits based on post-harvest considerations and maturity indices.

- Examine the biosynthesis, regulation, and mode of action of ethylene, as well as factors influencing ethylene production.
- Analyze water loss during fruit storage, identify influencing factors, and explore methods to control water loss.

Unit II

- Cell wall associated enzymes: polygalactouranase, Rhamnogalactouranase, pectin methyl esterase, Beta- galactosidase etc. Their role in textural change
- Polyphenol oxidases, lipoxygenase.
- Post harvest disorders in fruits and vegetables; mealiness, chilling injury etc.
- Role of minerals in post harvest storage life of fruits and vegetables with special reference to Ca, Mg, Zn, Mo & Co.
- Storage atmospheres - CA Storage, MA Storage, Hypobaric Storage.
- Management of post harvest processes and its importance to reduce post harvest losses: temperature management, atmospheric control and genetic control.

Learning outcomes:

- Analyze the roles of cell wall-associated enzymes and enzymes like polyphenol oxidases and lipoxygenase in textural changes.
- Recognize and address post-harvest disorders in fruits and vegetables.
- Explain the importance of minerals in extending the storage life of fruits and vegetables, with a focus on specific elements.
- Evaluate different storage atmospheres and their suitability for various fruits and vegetables.
- Apply management strategies for post-harvest processes, including temperature and atmospheric control, to minimize post-harvest losses.

References:

1. Michael knee. *Fruit Quality and its Biological Basis*; (CRC press).
2. M. Black & J.D Bewely. *Seed Technology and its Biological Basis*. (CRC press).
3. L.N David, M.C Michael. *Leningers Principle of Biochemistry*. (FreeMan and company, New York).

4. P. Trevor, L.R.B Phillips. *Enzymes in Biochemistry and Biotechnology. (*Harwood 2007).
5. Bench ALR & Sanchez RA. 2004. *Handbook of Seed Physiology*. (Food Product Press).
6. Wills R.B.H, W.B. McGlasson, Graham.D, Lee T.H and Hall E.G; *An Introduction to the Physiology and Handling of Fruits and Vegetables*.(CBS publishers)