

Assessment and Grading:

Assessment in this course will be multifaceted and may include the following components:

Examinations: Regular quizzes, mid-term exams, and a comprehensive final exam will assess your understanding of course materials.

Assignments: Homework assignments, research papers, or case studies will be assigned to reinforce theoretical knowledge and analytical skills.

Class Participation: Active engagement in class discussions, presentations, and group activities will be considered in the evaluation.

Grading Criteria (Note: These percentages are subject to adjustment based on the course structure):

Examinations: 80%

Class Participation: 5%

Assignments: 10%

Attendance: 5%

Feedback and Assessment Criteria:

- Constructive feedback will be provided on assignments and exams to help you understand your performance and areas for improvement.
- Clear assessment criteria, rubrics, and expectations will be provided at the beginning of the course to guide your work.
- Please feel free to seek clarification on grading and assessment-related questions throughout the course.
- Students with special needs may contact the concerned teacher before hand.

FT23116CR

Semester III

Cereal, Pulses and Oil seed Technology (4+0+0)

Course Description:

This course provides an in-depth understanding of the structure, chemical composition, processing qualities, and technological significance of cereals, pulses, and oilseeds. Students will explore various aspects of grain and oilseed processing, including milling, oil extraction, refining, and the production of value-added products. Additionally, the course covers the importance of these food sources in the Indian diet and their nutritional significance.

Unit I

- Structure, chemical composition and types of wheat grain and its relation to processing qualities, Enzymes of wheat and their technological significance.
- Wheat milling – principle, conditioning, and milling systems. Flour streams, extraction rates and their composition.
- Dough rheology and dough testing apparatus such as recording dough mixers, load extension meter.
- Bread making processes. Soft and hard wheat products: types, chemistry, and functionality of ingredients.

Learning outcomes:

- Understand the structure and chemical composition of wheat grain and its relation to processing qualities.
- Explain the role of enzymes in wheat and their technological significance.
- Describe the principles of wheat milling, including conditioning and milling systems.
- Analyze flour streams, extraction rates, and their composition.
- Evaluate dough rheology and use dough testing apparatus such as recording dough mixers and load extension meters.
- Demonstrate an understanding of bread making processes.
- Differentiate between soft and hard wheat products, including types, chemistry, and ingredient functionality.

Unit II

- Rice grain structure and chemistry

- Milling of rice – types of rice mill. Factors affecting rice yield during milling. By-products of rice milling and their utilization. Cooking quality of rice.
- Parboiling rice – traditional method and their drawbacks. CFTRI process of parboiling. Properties of parboiled rice. Changes during parboiling. Advantages and disadvantages of parboiling.
- Rice convenience foods – precooked rice, canned rice, expanded rice, rice based infant food formulas, rice puddings and breads, rice cakes, rice noodles and fermented foods.

Learning outcomes:

- Examine the structure and chemistry of rice grain.
- Discuss the types of rice mills and factors affecting rice yield during milling.
- Identify by-products of rice milling and their utilization.
- Evaluate the cooking quality of rice.
- Compare traditional and CFTRI methods of parboiling rice, understanding properties and changes during parboiling.
- Assess the advantages and disadvantages of parboiling.
- Explore the production of rice convenience foods such as precooked rice, canned rice, expanded rice, and rice-based infant food formulas.

Unit III

- Corn: Composition and structure, wet and dry milling of corn, Corn products.
- Oats: Composition, structure, milling and nutritional significance of oats. Oat products
- Barley: Composition, structure and milling of barley. Malting of barley.
- Millets: Nutritional significance and processing potential of some common millets such as Foxtail, Proso, Kodo, & pearl millet.

Learning outcomes:

- Analyse the composition and structure of corn and its wet and dry milling processes.
- Describe corn products.
- Investigate the composition, structure, milling, and nutritional significance of oats and oat products.
- Examine the composition, structure, milling, and malting of barley.
- Evaluate the nutritional significance and processing potential of common millets like Foxtail, Proso, Kodo, and pearl millet.

Unit IV

- Types of oil seeds and their chemical composition.
- Oil extraction – Mechanical and solvent extraction and refining.
- Processing of oil seeds for protein concentrates and isolates.
- Margarine manufacturing processing and its uses.
- Structure and composition of pulses, their importance in Indian diet. Dhal milling and processing of pulses.

Learning outcomes:

- Identify various types of oilseeds and their chemical composition.
- Explain the principles of oil extraction, including mechanical and solvent extraction, and refining.
- Explore the processing of oilseeds for protein concentrates and isolates.
- Understand margarine manufacturing processes and its uses.
- Describe the structure and composition of pulses, emphasizing their importance in the Indian diet.
- Discuss the milling and processing of pulses for various food applications.

References:

1. Pomeranz, Y. (1998). *Wheat: Chemistry and Technology*, Vol. I 3rd Ed., American Association of Cereal Chemists, St. Paul, MN, USA.
2. Juliano, B. O. (1985). *Rice Chemistry and Technology*, American Association of Cereal Chemists, St. Paul, MN, USA.
3. Samuel, A.M. (1996). *The Chemistry and Technology of Cereal as Food and Feed*. CBS Publishers & Distribution, New Delhi.
4. Dandy, D. A. V & Dobraszczyk, B. J. (2001) *Cereal and Cereal Products: Chemistry and Technology*, Aspen Publishers.
5. Kent, N. L. & Evers, A. D. (1994) *Kent's Technology of cereals* 4th Ed. Elsevier science Ltd. Oxford, U. K.

FT23117CR

Nutraceuticals and Toxicology (4+0+0)

Course Description:

This course delves into the fascinating intersection of nutraceuticals and toxicology. Students will explore the world of nutraceutical factors, their classification, sources, and mechanisms of action, along with their specific roles in various foods. Additionally, the course covers essential concepts in toxicology, including dose-response relationships, phases of toxicological effects, toxicity testing methods, and the manifestation of organ toxicity. Students will also gain insights into various toxins, antinutrients in plant foods, contaminants introduced during processing, and the impact of heavy metals and pesticides on food safety.

Unit – I

- Introduction - Definition, Classification of nutraceutical factors- Food and non food sources, mechanism of action, nutraceutical factors in specific foods and chemical nature.
- Dietary fibre – Types, Physical and physiological properties of dietary fiber Hypocholesterolemic, hypolipidemic and hypoglycemic effects. Role in prevention of CHD and cancer.
- Probiotics & Prebiotics – Specific and non specific physiological effects of probiotics. Different types of prebiotics and their chemical nature. Concept of synbiotics.
- Oxidative stress- Free radicals and Reactive Oxygen Species and types.
- Antioxidants – role and types.

Learning outcomes:

Define nutraceuticals and classify them based on food and non-food sources.

- Explain the mechanisms of action of nutraceutical factors and their chemical nature.
- Analyze the presence of nutraceutical factors in specific foods.
- Describe dietary fiber, its types, and its physical and physiological properties.
- Evaluate the hypocholesterolemic, hypolipidemic, and hypoglycemic effects of dietary fiber.
- Discuss the role of dietary fiber in the prevention of Coronary Heart Disease (CHD) and cancer.
- Explore the physiological effects of probiotics and prebiotics, including synbiotics.
- Define oxidative stress, free radicals, Reactive Oxygen Species (ROS), and their types.
- Discuss the role and types of antioxidants in combating oxidative stress.

Unit – II

- Fatty acid as functional food- Nomenclature of Mono and poly-unsaturated fatty acids.
- Eicosanoid metabolism of fatty acids and its implications in human health
- Omega 3 fatty acids- insulin resistance and Lipoprotein Metabolism
- Biosynthesis of common phytochemicals- Shikmic acid and mevalonic acid pathway.
- Bio synthesis of phenylpropanoids.

Learning outcomes:

- Name mono and polyunsaturated fatty acids and their nomenclature.
- Explain eicosanoid metabolism of fatty acids and its implications for human health.
- Explore the role of Omega-3 fatty acids in insulin resistance and lipoprotein metabolism.
- Describe the biosynthesis of common phytochemicals through the Shikmic acid and mevalonic acid pathways.
- Explain the biosynthesis of phenylpropanoids.

Unit – III

- Basic concepts of toxicology- dose response relationship - frequency response.
- Phases of Toxicological Effects- Exposure Phase, Toxicokinetic Phase, Toxicodynamic Phase
- Toxicity testing- Toxicological testing methods
- Manifestation of organ toxicity.
- Biotransformation reactions- Phase I and Phase II reactions

Learning outcomes:

- Define basic toxicological concepts, including dose-response relationships and frequency response.
- Identify and describe the phases of toxicological effects: Exposure Phase, Toxicokinetic Phase, and Toxicodynamic Phase.
- Analyze the methods used in toxicity testing.
- Discuss the manifestation of organ toxicity.
- Explain biotransformation reactions, including Phase I and Phase II reactions.

Unit -IV

- Animal Toxins: mode of action & clinical symptoms- Scombroid Poisoning, Saxitoxin, Pyropheophorbide-A, Tetrodotoxin, Ciguatoxin
- Toxicants and antinutrients in Plants foods.
- Toxins produced during processing.
- Pesticides and drug residues
- Heavy Metals – Mercury, Lead, Cadmium, Arsenic, selenium.

Learning outcomes:

- Explain the mode of action and clinical symptoms associated with animal toxins, including Scombroid Poisoning, Saxitoxin, Pyropheophorbide-A, Tetrodotoxin, and Ciguatoxin.
- Identify toxins and antinutrients present in plant foods.
- Discuss the production of toxins during food processing.
- Evaluate the presence of pesticides and drug residues in food.
- Analyze the impact of heavy metals, including Mercury, Lead, Cadmium, Arsenic, and Selenium, on food safety.

References

1. Goldberg, I.. Functional Foods: Designer Foods, Pharmafoods, Nutraceuticals. United States: Springer US, 2012.
2. Handbook of Nutraceuticals and Functional Foods. United Statesby Wildman: Taylor & Francis, 2016.
3. Functional Foods: Biochemical and Processing Aspects byJohn Shi, G. Mazza, Marc Le Maguer, CRC Press 2006.
4. Lockwood, Brian. Nutraceuticals: A Guide for Healthcare Professionals. United Kingdom: Pharmaceutical Press, 2007.
5. Postharvest Physiology and Biochemistry of Fruits and Vegetables.Postharvest Physiology and Biochemistry of Fruits and Vegetablesby Elhadi M. Yahia. United Kingdom: Elsevier Science, 2018.
6. Deshpande, S.S.. Handbook of Food Toxicology. United States: Taylor & Francis, 2002.
7. Maga.Food Additive Toxicology. Hong Kong: Taylor & Francis, 1995.
8. Food Toxicologyby Carl K.Winter. United States: CRC Press, 2000.

9. Omaye, Stanley T.. Food and Nutritional Toxicology. United States: CRC Press, 2004.

FT23118CR

Dairy Technology (4+0+0)

Course Description:

This course provides a comprehensive overview of dairy technology, covering all aspects of milk production, processing, and the manufacture of various dairy products. Students will explore the scope of the dairy industry in India, milk composition, processing techniques, and the production of items such as cheese, ice cream, and traditional Indian dairy products. Additionally, the course examines the impact of processing on milk components and nutritional value, as well as quality standards for dairy products.

Unit – I

- Scope of dairy industry in India. Importance & sources of milk.
- Composition of milk, Factors affecting composition of milk.
- Structure and Chemistry of Milk-Milk fat, proteins, enzymes, lactose

Learning outcomes:

- Understand the scope and importance of the dairy industry in India.
- Identify sources of milk and its significance in the human diet.
- Analyze the composition of milk and the factors that affect its composition.
- Describe the structure and chemistry of milk components, including milk fat, proteins, enzymes, and lactose.

Unit – II

- Storage, transportation and distribution of milk.
- Processing of market milk- standardization, toning of milk, homogenization. Pasteurization and sterilization.
- Milk products - Processing of cream, butter, butter oil, condensed milk, evaporated milk, whole and skimmed milk.
- Acidified milk products: Yogurt, Kefir, butter milk, sour milk.
- Effect of processing on milk components and nutritive value.

Learning outcomes:

- Explain the principles of milk storage, transportation, and distribution.
- Describe the processing of market milk, including standardization, toning, homogenization, pasteurization, and sterilization.

- Explore the production processes for milk products such as cream, butter, butter oil, condensed milk, evaporated milk, whole milk, and skimmed milk.
- Discuss the production and processing of acidified milk products like yogurt, kefir, buttermilk, and sour milk.
- Evaluate the effects of processing on milk components and the nutritive value of dairy products.

Unit – III

- Cheese: Classification and technology of cheese manufacturing. Packaging of cheese.
- Production of Ice creams & its quality control.
- Instantization of milk. Milk powder

Learning outcomes

- Classify cheese and understand the technology involved in cheese manufacturing.
- Discuss the packaging of cheese products.
- Explore the production of ice cream and methods for quality control.
- Explain the instantization process of milk and the production of milk powder.

Unit – IV

- Traditional dairy products of India: Paneer, Srikhand, Rabri, Kulfi, chhana, Lassi.
- Bioactive peptides derived from milk proteins.
- In plant cleaning system.
- Quality standards of milk and milk products.

Learning outcomes:

- Identify and describe traditional dairy products of India, including paneer, srikhand, rabri, kulfi, chhana, and lassi.
- Examine bioactive peptides derived from milk proteins.
- Understand the in-plant cleaning system in dairy processing.
- Familiarize with quality standards and regulations for milk and milk products.

References:

1. Technology of Dairy Products. Germanyby Early. R. : Springer, 1998.

2. De, Sukumar. Outlines of Dairy Technology. India: Oxford University Press, 1991.
3. Chemistry and Testing of Dairy Products by Athestem.

FT23119CR

Course Description:

This practical course focuses on skill development in the processing and evaluation of cereal grains and cereal-based products. Through hands-on experiences and laboratory work, students will learn various physico-chemical testing methods, milling techniques, quality assessment of flours, parboiling processes, rheological properties of dough, starch pasting properties, baking procedures, extrusion cooking, solvent extraction of oilseeds, and oil quality evaluation.

Additionally, students will have the opportunity to visit wheat and rice processing plants and engage in activities related to yeast activity and protein isolates from legumes.

Skill Development in Cereal and Cereal Products (Practical)(0+0+2)

- Physico-chemical testing of wheat and rice.
- Experimental milling of wheat and rice. Assessment of per cent of head rice, broken, immature kernels and degree of polish in rice.
- Determination of quality characteristics of flours.
- Experimental parboiling and evaluation of quality of parboiled rice.
- Evaluation of cooking quality of rice.
- Rheological properties of dough using Farinograph/ Extensograph/Mixograph.
- Pasting properties of starches using Visco-amylograph/RVA.
- Experimental baking of bread, cake and biscuit and their evaluation,
- Experimental extrusion cooking and quality evaluation of extrudates.
- Solvent extraction of oil seeds.
- Quality evaluation of oils.
- Visit to wheat and rice processing plants.
- Determination of yeast activity
- Preparation of protein isolates from legumes and evaluation of cooking quality of legumes.

Learning outcomes

- Perform physico-chemical testing of wheat and rice grains, assessing key attributes.
- Execute experimental milling of wheat and rice grains and assess milled rice quality.

- Determine the quality characteristics of flours derived from cereal grains.
- Perform experimental parboiling of rice and evaluate parboiled rice quality.
- Evaluate the cooking quality of rice, considering factors such as texture and taste.
- Analyze rheological properties of dough using instruments like Farinograph, Extensograph, or Mixograph.
- Assess pasting properties of starches using instruments like Visco-amylograph or RVA.
- Participate in experimental baking of bread, cake, and biscuits, and evaluate product quality.
- Engage in experimental extrusion cooking and assess the quality of extrudates.
- Conduct solvent extraction of oilseeds and evaluate the quality of extracted oils.
- Visit wheat and rice processing plants to gain practical industry insights.
- Determine yeast activity in food processing.
- Prepare protein isolates from legumes and evaluate the cooking quality of legumes.

References:

1. Cauvain, Stanley P., Young, Linda S.. Baked Products: Science, Technology and Practice. Germany: Wiley, 2008.
2. Bakery Technology & Engineering by Samueal A. Matz.
3. Manual of American Association of Cereal Chemists

FT23120DCE

Course Description:

This practical course focuses on developing hands-on skills and expertise in various aspects of dairy technology. Students will gain practical experience in the quantitative estimation of milk constituents, testing for milk quality, detecting adulterants and preservatives, and visiting local milk processing plants. Additionally, students will learn the art of preparing common milk products, including flavored milks, yogurt, butter, and ice cream.

Skill Development in Dairy Technology (Practical) (0+0+2)

- Quantitative estimation of milk constituents such as moisture, total solids, fat.
- Determination of acidity of milk.
- Determination of specific gravity of milk.
- Platform tests on given samples of milk.
- Determination of adulterants in milk, ghee, butter, ice cream etc.
- Detection of preservatives in milk.
- COB test.
- Visit to local milk processing plant.
- Preparation of common milk products
 - Flavoured milks.
 - Yoghurt.
 - Butter.
 - Ice-cream.

Learning outcomes

- Quantitatively estimate milk constituents such as moisture, total solids, and fat.
- Determine the acidity of milk.
- Determine the specific gravity of milk.
- Conduct platform tests on given samples of milk.
- Determine adulterants in milk, ghee, butter, ice cream, etc.
- Detect preservatives in milk.
- Perform the Chloroform-Butanol (COB) test.
- Visit a local milk processing plant.

- Prepare common milk products, including flavored milks, yogurt, butter, and ice cream.

References:

1. De, Sukumar. Outlines of Dairy Technology. India: Oxford University Press, 1991
2. Chemistry and Testing of Dairy products by H.V. Atherton & J.A. Newlander
3. Spreer, Edgar. Milk and Dairy Product Technology. United Kingdom: CRC Press, 2017.
4. Dairy Chemistry by H.H. Sommer.

FT23121DCE

Human Nutrition (2+0+0)

Course Description:

The course "Human Nutrition" offers a comprehensive exploration of the fundamental principles of nutrition and their practical applications in promoting and maintaining human health. Through a two-semester format, students will delve into the intricate relationship between food, nutrition, and overall well-being. The course is divided into two units, each covering distinct aspects of nutrition.

Unit I

- Introduction to Human Nutrition: Food, Nutrition & Health.
- Nutrient requirements & recommendation
- Digestion & Absorption of Nutrients
- Methods of cooking.
- Enhancing nutritional quality of the Diet.
- Lifecycle nutrition
- Principles of meal planning
- Food-based dietary guidelines
- Nutrition for Adults, pregnancy, lactation, infancy, preschools, adolescents & elderly.

Learning outcomes:

- Gain an understanding of the key concepts of human nutrition, including the relationship between food, nutrition, and health.
- Explain the nutrient requirements and recommendations for various age groups and life stages.
- Understand the processes of digestion and absorption of nutrients within the human body.
- Explore different methods of cooking and their impact on nutrient retention.
- Identify strategies for enhancing the nutritional quality of diets.
- Analyze the principles of meal planning and their application in different life stages.

- Recognize the importance of food-based dietary guidelines in promoting health.
- Describe specific nutritional needs for adults, pregnancy, lactation, infancy, preschoolers, adolescents, and the elderly.

Unit II

- Clinical & therapeutic diets
- Diet in lifestyle disorders:- diabetes, CVD, Cancer.
- Diet in fever, burns & surgery
- Nutritional care in weights manager.
- Special Nutrition.
- Food borne diseases (Introduction).
- Exercise & Sports Nutrition.
- Nutrition & infection

Learning outcomes

- Understand the principles and applications of clinical and therapeutic diets.
- Evaluate the role of diet in managing lifestyle disorders such as diabetes, cardiovascular diseases, and cancer.
- Describe dietary considerations in fever, burns, and post-surgery recovery.
- Demonstrate knowledge of nutritional care for weight management.
- Explain the concept of special nutrition for individuals with specific dietary requirements.
- Introduce the concept of foodborne diseases and their prevention.
- Analyze the principles of exercise and sports nutrition.
- Understand the relationship between nutrition and infection.

References:

1. Davidson, Sirstanley, Passmore, R. J. F. Brock, A. S. Trustwell, (1975). Human Nutrition and Dietetics 6th Edition, The English language book society and Churchill Living stone.
2. Swaminathan, (1985). Advanced Text Book on Foods & Nutrition 2nd Edition, Bangalore Printing & Publishing Co. Ltd.
3. Mudambi Sumati R. & Rajagopal, M. V. (1995). Fundamentals of Food & Nutrition, 3rd Edition, New Age International (P) Limited, Publishers.

4. J. Mann, A. S. Trustwell, (2017). Essentials of Human Nutrition 5th Edition Oxford University Press.

FT23122DCE

Entrepreneurship and Project Development (2+0+0)

Course description

This course focuses on equipping students with the essential knowledge and skills required to become successful entrepreneurs and project developers. It encompasses two units that explore the concepts of entrepreneurship, project identification, feasibility analysis, and financial aspects of project development. Students will gain insights into the characteristics of successful entrepreneurs, the motivation behind entrepreneurship, and the challenges they face. Additionally, the course covers the practical aspects of starting and managing a small business, including project generation, market analysis, cost estimation, and financial analysis.

Unit I:

- Entrepreneurship–Concept and development. Characteristics and personal attributes of successful entrepreneurship.
- Entrepreneurial motivation. Functions and role of entrepreneurs. Problems faced by entrepreneurs and their remedies.
- Identification of project, generation and screening of project ideas. Classification of projects.
- Forms of ownership–Sole proprietorship, partnership, company and cooperative society.

Learning outcomes:

- Understand the concept of entrepreneurship and its development.
- Identify the characteristics and personal attributes of successful entrepreneurs.
- Explore entrepreneurial motivation and its role in business ventures.
- Recognize the functions and roles played by entrepreneurs in the business ecosystem.
- Analyze the common problems faced by entrepreneurs and propose remedies.
- Learn to identify viable project opportunities and screen project ideas.
- Classify projects based on various criteria.
- Differentiate between forms of ownership, including sole proprietorship, partnership, company, and cooperative society.

UNIT II:

- Steps for starting a small business, procedure and formalities for registration. Incentives and subsidies. Market and demand analysis–Demand forecasting
- Technical, management and economical analysis of projects
- Estimation of project cost–Objectives, components and basic of estimates. Working capital requirement and its estimates
- Sources of Finance–Short term and long terms sources. Techniques of financial analysis–Cash flow Estimates, Break-even analysis, payback period, average rate of return, Net Present Value and Internal rate of Return.

Learning outcomes:

- Describe the steps involved in starting a small business.
- Understand the procedures and formalities required for business registration.
- Explore incentives and subsidies available for small businesses.
- Learn techniques for market and demand analysis, including demand forecasting.
- Perform technical, management, and economic analyses of projects.
- Estimate project costs, including objectives, components, and basic estimation methods.
- Determine working capital requirements and estimate them effectively.
- Identify sources of finance for projects, including short-term and long-term sources.
- Apply financial analysis techniques such as cash flow estimates, break-even analysis, payback period, average rate of return, Net Present Value (NPV), and Internal Rate of Return (IRR) to evaluate project viability.

FT23005GE

FOOD SAFETY (1+1+0)

Course Description:

This course is designed to provide students with a comprehensive understanding of food safety principles and practices. It explores the importance of safe food, identifies various hazards in food, and examines the management and mitigation of these hazards. The course also covers topics related to food laws and regulations, including the Food Safety and Standards Act 2006, and provides insights into food labeling, nutrition claims, and emerging issues in food safety, such as zoonotic diseases and genetically modified foods.

Unit – I

- Definition of food safety and importance of safe food
- Hazards and types of hazards
- Physical and Chemical hazards- Sources harmful effects and management
- Naturally occurring toxicants in foods, Process induced food toxicants, Safety aspects of food additives
- Biological hazards, food borne illnesses
- Toxicants of fungal and bacterial origin
- Food adulteration, common food adulterants; Methods to detect food adulteration
- Food safety and Quality management system; HACCP

Learning outcomes:

- Define food safety and emphasize the significance of ensuring the safety of food.
- Identify different types of hazards that can compromise food safety.
- Explore physical and chemical hazards in food, including their sources, harmful effects, and management strategies.
- Discuss naturally occurring toxicants in foods, process-induced food toxicants, and the safety aspects of food additives.
- Examine biological hazards, including foodborne illnesses, and discuss toxicants of fungal and bacterial origin.
- Investigate food adulteration, common food adulterants, and methods for detecting food adulteration.

- Introduce the concept of food safety and quality management systems, including Hazard Analysis and Critical Control Points (HACCP).

Unit – II (Tutorial)

- Food Safety and Standards Act 2006 and regulation 2011.
- Registration and Licensing
- Packaging and labeling
- Nutrition and Health Claims
- Zoonotic diseases. Eg Bird flu, Swine flu
- Genetically modified food- safety aspects

Learning outcomes:

- Familiarize students with the Food Safety and Standards Act 2006 and its associated regulations in 2011.
- Explain the processes of registration and licensing for food businesses.
- Discuss packaging and labeling requirements for food products.
- Explore nutrition and health claims made on food packaging.
- Introduce the concept of zoonotic diseases and provide examples such as Bird flu and Swine flu.
- Examine the safety aspects related to genetically modified foods.

References:

1. Food Safety & standards Act 2006, Commercial law Publishers (India) Pvt. Ltd
2. Potter, Norman N., Hotchkiss, Joseph H.. Food Science: Fifth Edition. United States: Springer US, 2012.
3. Schmidt, Ronald H., Rodrick, Gary E.. Food Safety Handbook. Germany: Wiley, 2005.

FT23006OE

Starch Chemistry & Technology (2+0+0)

Course Description:

This course delves into the fascinating world of starch, a versatile carbohydrate found abundantly in nature, and its applications in various industries. It covers the fundamentals of starch chemistry, including its sources, classification, granular and molecular structure, and physio-chemical properties such as swelling, solubility, gelatinization, and retrogradation. The course also explores the production of starch from plant sources using wet and dry milling processes, the concept of resistant starch, and various methods for the modification of starch, including physical, chemical, and biological approaches.

Unit I

- Starch: Introduction, sources, classification.
- Structure of starch: Granular structure and molecular structure.
- Physio-chemical properties of starch: Swelling, solubility index, gelatinization and retrogradation of starch.
- Use of starch in food, pharmaceutical and textile industries.

Learning outcomes:

- Introduce the concept of starch, including its sources and classification.
- Describe the granular and molecular structure of starch.
- Explore the physio-chemical properties of starch, including swelling, solubility index, gelatinization, and retrogradation.
- Examine the diverse applications of starch in the food, pharmaceutical, and textile industries.

Unit II

- Production of starch: Production of starch from plant sources using
- Wet and Dry milling of starch.
- Resistant starch.
- Modification of starch: Physical, Chemical and Biological modification of starch.

Learning outcomes:

- Discuss the production of starch from plant sources, emphasizing wet and dry milling processes.

- Introduce the concept of resistant starch and its significance.
- Explore various methods for the modification of starch, including physical, chemical, and biological approaches.

References:

1. Pomeranz, Y. (1998). *Wheat: Chemistry and Technology*, Vol. I 3rd Ed., American Association of Cereal Chemists, St. Paul, MN, USA.
2. Juliano, B. O. (1985). *Rice Chemistry and Technology*, American Association of Cereal Chemists, St. Paul, MN, USA.
3. Samuel, A.M. (1996). *The Chemistry and Technology of Cereal as Food and Feed*. CBS Publishers & Distribution, New Delhi.
4. Dandy, D. A. V & Dobraszczyk, B. J. (2001) *Cereal and Cereal Products: Chemistry and Technology*, Aspen Publishers.
5. Kent, N. L. & Evers, A. D. (1994) *Kent's Technology of cereals* 4th Ed. Elsevier science Ltd. Oxford, U. K.