Course Title: Baking Technology
Course Code: FT-306
Resource Person: Ubaid ur Rahman
Department: Food Science and Technology

School of Food and Agricultural Sciences (SFAS) Vision

SFAS endeavors to be a premier center of excellence, offering innovative, high-quality education and professional programs aimed at achieving academic and research excellence, enriching the lives of individuals and making a difference in the world of academia and industry, and to develop a society of professionals, who can contribute towards the betterment of their respective communities.

SFAS Mission

SFAS provides an intellectually rich, collaborative, research-focused and dedicated learning environment for students, faculty, and staff, while serving the community at various levels. SFAS at UMT has been established with the aim to integrate recent advances in food sciences/technology and agricultural innovations.

BS Food Science and Technology (Program) Objectives

Students graduating with a B.Sc. Food Science & Technology degree would be able to:

1. *Explain the basic principles of food and its multidisciplinary scope*
2. *Describe the physical, chemical, and biological properties of food and their effects on food safety, sensory and nutritional quality.*
3. *Apply analytical techniques to characterize composition and to identify physical, chemical and biological changes in foods.*
4. *Explain the effects of food processing, engineering, preservation, packaging, and storage on food safety and quality.*
5. *Identify the importance of food laws and regulations in ensuring safety and quality of foods.*
6. *Conduct applied research, and use statistical tools in experimental design and data analysis.*
7. *Apply acquired knowledge to real world situations in food systems, components, products and processes.*
8. *Apply critical thinking to professional problems.*
9. *Develop organizational, team work, and leadership skills.*
10. *Demonstrate professional skills and thoughts of ethical, society, integrity, and respect for diversity.*
11. *Demonstrate preparedness for continued reflective practice and lifelong learning relevant to careers in food science.*

Course Objectives

The main objectives of this course include:

1. *Concepts and terminologies related to Baking Science and Technology*
2. *Identify the characteristics, role and importance of various ingredients in developing different bakery products*
3. *Learn the formulations and processes to develop different bakery products and methods to analyze the quality of bakery products*
4. *Enhance the awareness of quality and safety control systems in baking industry*

Learning Objectives

Sr#	Course Learning Objectives	Link with Program Learning Objectives
1.	To understand the main concepts, theoretical approaches and status of baking industry with special reference to the local and international scenario	Explain the basic principles of food and its multidisciplinary scope
2.	To identify the types, physicochemical characteristics, role and importance of different ingredients in formulating the quality bakery products	Describe the physical, chemical, and biological properties of food and their effects on food safety, sensory and nutritional quality
3.	To learn the basic principles and science of baking	Explain the effects of food processing, engineering, preservation, packaging, and storage on food safety and quality
4.	To describe the types, formulations, manufacturing processes, methods of quality analyses and problems of different bakery products	Explain the effects of food processing, engineering, preservation, packaging, and storage on food safety and quality Apply analytical techniques to characterize composition and to identify physical, chemical and biological changes in foods
5.	To formulate and develop products and process techniques in bakery	Explain the effects of food processing, engineering, preservation, packaging, and storage on food safety and quality Apply analytical techniques to characterize composition and to identify physical, chemical and biological changes in foods
6.	To understand the challenges and strategies to maintain the quality and safety in baking industry	Explain the effects of food processing, engineering, preservation, packaging, and storage on food safety and quality
7.	To learn the basic concepts and types of different functional bakery products	Describe the physical, chemical, and biological properties of food and their effects on food safety, sensory and nutritional quality

Learning Outcomes

1. *Identify the key aspects of baking science and technology, characteristics, quality criteria and importance of ingredients to develop bakery products and basic principles of mixing, fermentation and baking processes*
2. *Identify the types, formulations and mechanisms to develop different bakery products and the mechanisms of bread spoilage and baking problems and implement food quality and safety in baking process lines and products*
3. *Demonstrate the preparation of different bakery products, under close supervision, having limited skill requirements in a routine and predictable situation with the ability to select flour and other ingredients/food additives, using bakery machineries in a limited context, understand the context of work and quality, and with the knowledge of basic facts and work processes, and with the responsibility for own work*
4. *Understand the flour and dough quality testing related to baking*

Teaching Methodology Interactive

Classes:

1. *Use media to increase student engagement and improve learning outcomes.*
2. *Try adding metaphors to help students remember details.*
3. *Give students a real-world context with extra projects to reinforce skills.*
4. *Provide practical practice within your lessons. Making it relatable will do wonders.*

Case based teaching:

Class Participation

Positive, healthy and constructive class participation will be monitored for each class. Particular emphasis will be given to participation during the presentation sessions. The manner in which the question is asked or answered will also be noted.

Word of advice

Assignments/ projects are very demanding and time consuming. Since you might be exposed to the real corporate environment, the ensuing reality checks could be demoralizing and frustrating. So you must learn to handle the intra group conflicts and any clash of interests. Unless you start working on the assignments/ projects right away from the very first day you are likely to miss the dead lines.

Participant Responsibilities:

Student should be responsible enough to practice whatever they have learnt during class sessions. They should also implement it to other subjects as well. They are expected to come prepared in the class.

Class activities:

Presentations

After careful analysis, resource person will constitute the groups to achieve balanced heterogeneity among groups, for group assignments/projects and will have the final decision in this regard. Every member of the group is expected to be able to handle all aspects of the assignments. Groups are not allowed to choose presenters for various parts of the presentations; instead resource person will nominate them. Individuals will be judged for their understanding of the topic through question handling. Q/A section of the presentations will way heavily for grading of assignments/ projects.

Team Discussions:

During class, each student will work in a team on discussion questions. Teams will be assigned questions, allowed ten minutes for Internet research, and permitted five minutes to present their results. Points are earned by active participation with your team.

STUDENTS ARE REQUIRED TO READ AND UNDERSTAND ALL ITEMS OUTLINED IN THE PARTICIPANT HANDBOOK

Class Policy:

Be on Time

You need to be at class at the assigned time. After 10 minutes past the assigned time, you will be marked absent.

Mobile Policy

TURN OFF YOUR MOBILE PHONE! It is unprofessional to be texting or otherwise.

Email Policy

READ YOUR EMAILS! You are responsible if you miss a deadline because you did not read your email. Participants should regularly check their university emails accounts regularly and respond accordingly.

Class Attendance Policy

A minimum of 80% attendance is required for a participant to be eligible to sit in the final examination. Being sick and going to weddings are absences and will not be counted as present. You have the opportunity to use 6 absences out of 30 classes. Participants with less than 80% of attendance in a course will be given grade 'F' (Fail) and will not be allowed to take end term exams. International students who will be leaving for visa during semester should not use any days off except for visa trip. Otherwise they could reach short attendance.

Withdraw Policy

Students may withdraw from a course till the end of the 12th week of the semester. Consequently, grade W will be awarded to the student which shall have no impact on the calculation of the GPA of the student. A Student withdrawing after the 12th week shall be automatically awarded "F" grade which shall count in the GPA.

Moodle

UMT –LMS (Moodle) is an Open Source Course Management System (CMS), also known as a learning Management System (LMS). Participants should regularly visit the course website on MOODLE Course Management system, and fully benefit from its capabilities. If you are facing any problem using moodle, visit http://oit.umt.edu.pk/moodle. For further query send your queries to moodle@umt.edu.pk

Harassment Policy

Sexual or any other harassment is prohibited and is constituted as punishable offence. Sexual or any other harassment of any participant will not be tolerated. All actions categorized as sexual or any other harassment when done physically or verbally would also be considered as sexual harassment when done using electronic media such as computers, mobiles, internet, emails etc.

Use of Unfair Means/Honesty Policy

Any participant found using unfair means or assisting another participant during a class test/quiz, assignments or examination would be liable to disciplinary action.

Plagiarism Policy

All students are required to attach a "Turn tin" report on every assignment, big or small. Any student who attempts to bypass "Turn tin" will receive "F" grade which will count towards the CGPA. The participants submit the plagiarism report to the resource person with every assignment, report, project, thesis etc. If student attempts to cheat "Turn tin", he/she will receive a second "F" that will count towards the CGPA. There are special rules on plagiarism for final reports etc. all outlined in your handbook.

Communication of Results

The results of quizzes, midterms and assignments are communicated to the participants during the semester and answer books are returned to them. It is the responsibility of the course instructor to keep the participants informed about his/her progress during the semester. The course instructor will inform a participant at least one week before the final examination related to his or her performance in the course.

Course Outline

Course code: FT-306 **Course title:** Baking Technology

Program	BS Food Science and Technology
Credit Hours	3 (2-1)
Duration	16 weeks
Prerequisites (If any)	Cereal Technology
Resource Person Name and Email	Dr. Hafiz Ubaid ur Rahman ubaidurrahman@umt.edu.pk
Counseling Timing (Room#)	
Contact no.	
Web Links:- (Face book, Linked In, Google Groups, Other platforms)	

Chairman/Director Programme

Signature..... **Date**.....

Dean's signature..... **Date**.....

Grade Evaluation Criteria

Following is the criteria for the distribution of marks to evaluate final grade in a semester.

Marks Evaluation	Marks in percentage
Quizzes:	**5%**
Mid Term Exam:	**25%**
Assignment/Project:	**10%**
Presentation:	**10%**
End Term Exam:	**50%**
Theory Part	**30%**
Lab Part	**20%**
Total:	**100%**

Recommended Textbooks:

1. Cauvain, S. and Young, L. 2001. Baking problems solved. Woodhead Publishing Limited and CRC Press, ISBN 0-8493-1221-3.
2. Edwards, W.P. 2007. The Science of Bakery Products. The Royal Society of Chemistry, Thomas Graham House, Science Park, Milton Road, Cambridge CB4 0WF, UK. ISBN: 978-0-85404-486-3
3. Hui, Y.H. 2006. Bakery Products Science and Technology. Blackwell Publishing Professional 2121 State Avenue, Ames, Iowa 50014, US. ISBN-10: 0-8138-0187-7.
4. Pyler E.J and Gorton, L.A. 2008. Baking science and technology 4th Ed (Vol-I). Sosland Pub Co, Kansas. ISBN 978-0-9820239-0-7.
5. Pyler, E.J. .2010. Baking Science and Technology Volume II Formulation and Production Hardcover. ISBN-10: 0982023901.
6. Zhou, W. 2014. Bakery Products Science and Technology (Second Edition). John Wiley & Sons, Ltd. ISBN 978-1-119-96715-6.

Course: Baking Technology **Course code: FT-306**

No	Topics to be covered in the course	Learning Objective of this topic	Expected Outcomes from Students	Teaching Method	Assessment Criteria	Deadlines and Homework
1	Baking Science and Technology: History, overview, basic terms, current status of baking industry (Theory) Flour Quality Tests: Determination of wet and dry gluten, Instrumental flour color analysis (Lab)	To understand the main concepts, theoretical approaches and status of baking industry with special reference to the local and international scenario To identify the types, physicochemical characteristics, role and importance of different ingredients in formulating the quality bakery products	Identify the key aspects of baking science and technology, characteristics, quality criteria and importance of ingredients to develop bakery products and basic principles of mixing, fermentation and baking processes Understand the flour and dough quality testing related to baking	Lecture, discussion, practical demonstration	Class Participation	Within a Week
2	Baking Ingredients: Wheat flour, water, Shortening, Leavening agents (yeast and others), sugar and other sweeteners, salt, Enzymes, antioxidants and antimicrobials, improvers, emulsifiers etc. (Theory) Dough and Gluten Strength Tests: Farinograph, extensigraph, mixograph; Flour	To identify the types, physicochemical characteristics, role and importance of different ingredients in formulating the quality bakery products	Identify the key aspects of baking science and technology, characteristics, quality criteria and importance of ingredients to develop bakery products and basic principles of mixing, fermentation and baking processes Understand the flour and dough quality testing related to baking	Lecture, discussion, video demonstration	Class participation	Within a Week

	starch viscosity test using amylograph (Lab)					
3	Principles of Baking: mixing, fermentation, baking (Theory) Bread Manufacturing and Analysis: Recipe, practical demonstration, product analysis: (Lab)	To learn the basic principles and science of baking To formulate and develop products and process techniques in bakery	Identify the key aspects of baking science and technology, characteristics, quality criteria and importance of ingredients to develop bakery products and basic principles of mixing, fermentation and baking processes Demonstrate the preparation of different bakery products, under close supervision, having limited skill requirements in a routine and predictable situation with the ability to select flour and other ingredients/food additives, using bakery machineries in a limited context, understand the context of work and quality, and with the knowledge of basic facts and work processes, and with the responsibility for own work	Lecture, discussion, practical demonstration	Class participation	Within a Week
4	Bakery Products: Bread manufacturing process; formulation, mixing and mixing methods, fermentation process, baking process, cooling, packaging and storage; Types of breads (Theory):	To describe the types, formulations, manufacturing processes, methods of quality analyses and problems of different bakery products To formulate and develop products and process techniques in bakery	Identify the types, formulations and mechanisms to develop different bakery products and the mechanisms of bread spoilage and baking problems and implement food quality and safety in baking process lines and products Demonstrate the preparation of different bakery products, under close supervision, having limited skill requirements in a routine and predictable situation with the ability to select flour and other ingredients/food	Lecture, discussion, practical demonstration	Class participation	Within a Week

	Cake Manufacturing and Analysis: Recipe, practical demonstration, product analysis: (Lab)		additives, using bakery machineries in a limited context, understand the context of work and quality, and with the knowledge of basic facts and work processes, and with the responsibility for own work			
5	Bakery Products: Bread problems (Theory) Biscuit Manufacturing and Analysis: Recipe, practical demonstration, product analysis: (Lab)	To understand the challenges and strategies to maintain the quality and safety in baking industry To formulate and develop products and process techniques in bakery	Identify the types, formulations and mechanisms to develop different bakery products and the mechanisms of bread spoilage and baking problems and implement food quality and safety in baking process lines and products Demonstrate the preparation of different bakery products, under close supervision, having limited skill requirements in a routine and predictable situation with the ability to select flour and other ingredients/food additives, using bakery machineries in a limited context, understand the context of work and quality, and with the knowledge of basic facts and work processes, and with the responsibility for own work	Lecture, discussion, practical demonstration	Class participation and Quiz	Within a Week
6	Bakery Products: Cake manufacturing process, types of cakes (Theory) Muffin Manufacturing and Analysis: Recipe, practical demonstration, product analysis: (Lab)	To describe the types, formulations, manufacturing processes, methods of quality analyses and problems of different bakery products To formulate and develop products and process techniques in bakery	Identify the types, formulations and mechanisms to develop different bakery products and the mechanisms of bread spoilage and baking problems and implement food quality and safety in baking process lines and products Demonstrate the preparation of different bakery products, under close supervision, having limited skill requirements in a routine and predictable situation with the ability to select flour and other ingredients/food	Lecture, discussion, practical demonstration	Class participation	Within a Week

			additives, using bakery machineries in a limited context, understand the context of work and quality, and with the knowledge of basic facts and work processes, and with the responsibility for own work			

7	**Revision**	**Midterm**				Within a Week
8	Bakery Products: Cookies/biscuit manufacturing process (Theory) Cracker Manufacturing and Analysis: Recipe, practical demonstration, product analysis: (Lab)	To describe the types, formulations, manufacturing processes, methods of quality analyses and problems of different bakery products To formulate and develop products and process techniques in bakery	Identify the types, formulations and mechanisms to develop different bakery products and the mechanisms of bread spoilage and baking problems and implement food quality and safety in baking process lines and products Demonstrate the preparation of different bakery products, under close supervision, having limited skill requirements in a routine and predictable situation with the ability to select flour and other ingredients/food additives, using bakery machineries in a limited context, understand the context of work and quality, and with the knowledge of basic facts and work processes, and with the responsibility for own work	Lecture, discussion, practical demonstration	Class participation	Within a Week
9	Bakery Products: Cracker and doughnut manufacturing processes (Theory) Cake rusks Manufacturing and Analysis: Recipe,	To describe the types, formulations, manufacturing processes, methods of quality analyses and problems of different bakery products To formulate and develop products and process techniques in bakery	Identify the types, formulations and mechanisms to develop different bakery products and the mechanisms of bread spoilage and baking problems and implement food quality and safety in baking process lines and products	Lecture, discussion, practical demonstration	Class participation	Within a Week

	practical demonstration, product analysis: (Lab)		Demonstrate the preparation of different bakery products, under close supervision, having limited skill requirements in a routine and predictable situation with the ability to select flour and other ingredients/food additives, using bakery machineries in a limited context, understand the context of work and quality, and with the knowledge of basic facts and work processes, and with the responsibility for own work			
10	Bakery Products: Muffin and bagels manufacturing processes (Theory) Pizza Manufacturing and Analysis: Recipe, practical demonstration, product analysis: (Lab)	To describe the types, formulations, manufacturing processes, methods of quality analyses and problems of different bakery products To formulate and develop products and process techniques in bakery	Identify the types, formulations and mechanisms to develop different bakery products and the mechanisms of bread spoilage and baking problems and implement food quality and safety in baking process lines and products Demonstrate the preparation of different bakery products, under close supervision, having limited skill requirements in a routine and predictable situation with the ability to select flour and other ingredients/food additives, using bakery machineries in a limited context, understand the context of work and quality, and with the knowledge of basic facts and work processes, and with the responsibility for own work	Lecture, discussion, practical demonstration	Class participation	Within a Week
11	Bakery Products: Rusks and cake rusks manufacturing processes (Theory) Composite Flour Bread Manufacturing and Analysis: Recipe,	To describe the types, formulations, manufacturing processes, methods of quality analyses and problems of different bakery products To formulate and develop products and process techniques in bakery management system	Identify the types, formulations and mechanisms to develop different bakery products and the mechanisms of bread spoilage and baking problems and implement food quality and safety in baking process lines and products	Lecture, discussion, practical demonstration	Quiz and class participation	Within a Week

	practical demonstration, product analysis: (Lab)	To learn the basic concepts and types of different functional bakery products	Demonstrate the preparation of different bakery products, under close supervision, having limited skill requirements in a routine and predictable situation with the ability to select flour and other ingredients/food additives, using bakery machineries in a limited context, understand the context of work and quality, and with the knowledge of basic facts and work processes, and with the responsibility for own work			
12	Quality and Safety Control in Baking Industry (Theory) Functional Bakery Products Development: Recipe, practical demonstration, product analysis: (Lab)	To understand the challenges and strategies to maintain the quality and safety in baking industry To formulate and develop products and process techniques in bakery To learn the basic concepts and types of different functional bakery products	Identify the types, formulations and mechanisms to develop different bakery products and the mechanisms of bread spoilage and baking problems and implement food quality and safety in baking process lines and products Demonstrate the preparation of different bakery products, under close supervision, having limited skill requirements in a routine and predictable situation with the ability to select flour and other ingredients/food additives, using bakery machineries in a limited context, understand the context of work and quality, and with the knowledge of basic facts and work processes, and with the responsibility for own work	Lecture, discussion, practical demonstration	Class participation	Within a Week
13	Functional Bakery Products (Theory) Functional Bakery Products Development: Recipe, practical demonstration, product analysis:	To describe the types, formulations, manufacturing processes, methods of quality analyses and problems of different bakery products To learn the basic concepts and types of different functional bakery products	Identify the types, formulations and mechanisms to develop different bakery products and the mechanisms of bread spoilage and baking problems and implement food quality and safety in baking process lines and products	Lecture, discussion, practical demonstration	Class participation	

	(Lab)	To formulate and develop products and process techniques in bakery	Demonstrate the preparation of different bakery products, under close supervision, having limited skill requirements in a routine and predictable situation with the ability to select flour and other ingredients/food additives, using bakery machineries in a limited context, understand the context of work and quality, and with the knowledge of basic facts and work processes, and with the responsibility for own work			
14	Guest Lecture					Within a Week
15	Project Assessment and Student Presentations (Theory)	To evaluate student's critical ability to access and estimate challenges, processes and developments in baking science and technology		Class Participation	Presentation, Project submission and Viva	Within a Week
16	Final Examination	Application of all the concepts learned in Baking Technology		On campus examination	Paper and Viva	Within a Week