

Course Title: Sugar Technology
Course Code: FT-305
Resource Person: Rizwan-ur-Rehman
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 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.

Program Learning Objectives (PLO's)

Students graduating with BS Food Science and Technology shall be able to:

1. *Explain the basic principles of food sciences, and its multidisciplinary scope.*
2. *Explain the physical, chemical and biological properties of food and their effects on food safety, and 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 the processed/manufactured 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, production, and processes.*
8. *Apply critical thinking to professional problems.*
9. *Communicate effectively in both oral and written forms.*
10. *Develop organizational, teamwork, and leadership skills.*
11. *Demonstrate professional skills and thoughts of ethical, social integrity, and respect for diversity.*
12. *Demonstrate preparedness for continued reflective practice, and lifelong learning relevant to careers in food sciences.*

Course Objectives (CLO's)

After the completion of this course, a student will be able to:

1. Understand the Production and Demand supply of sugar production
2. Understand the various production techniques
3. Have a better understanding of various byproducts that can be manufactured along with sugar production.
4. Global challenges and opportunities in sugar production technologies

Learning Objectives

Sr#	Course Learning Objectives	Link with Program Learning Objectives
1.	Understand the Production and Demand supply of sugar production	Explain the basic principles of food sciences, and its multidisciplinary scope.
2.	Understand the various production techniques	Explain the effects of food processing, engineering, preservation, packaging, and storage on food safety and quality.
3.	Have a better understanding of various byproducts that can be manufactured along with sugar production.	Explain the effects of food processing, engineering, preservation, packaging, and storage on food safety and quality.
4.	Global challenges and opportunities in sugar production technologies	Explain the basic principles of food sciences, and its multidisciplinary scope

Course Learning Outcomes

After successful completion of the course work, students will have the skills to:

1. *Understand the challenges faced by the Pakistan Sugar industries.*
2. *Understand the production of sugarcane and sugar beet.*
3. *Identify the basic techniques involved in indigenous Gur making.*
4. *Identify different unit operations involved in raw sugar making.*
5. *Understand the working principles and design of different equipments used for the extraction, purification, evaporation, and crystallization the cane juice.*
6. *Understand the unit operations involved in the refining of raw sugar.*
7. *Learn different quality criteria for raw and refine sugars*
8. *Understand the factors involved in raw sugar production*
9. *Improve the understanding regarding the production of alcohol and other valuable organic compounds produced from molasses*
10. *Learn analyze the sugar cane, sugar beet for TSS, pH, fiber, ash, sucrose inversion and polarization*

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 reinforceskills.*
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 participants during the presentation sessions. How the question is asked or answered will also be noted. Your behavior, as business executives in the class will contribute to the class participation marks.

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 intragroup 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 deadlines.

Participant Responsibilities:

Students should be responsible enough to practice whatever they have learned during class sessions.



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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 weigh heavily for grading of assignments/ projects.

Class 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.

Applied Projects:

This is a practical-based course. Regular attendance is the best predictor of success. Students will perform different practices with detailed instructions, teacher demonstrations, and video tutorials.

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 phone 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 email 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 a grade 'F' (Fail) and will not be allowed to take end-term exams. International students who will be leaving for visas during semester should not use any days off except for visa trips. 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 an "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.umd.edu.pk/moodle>. For further query send your queries to moodle@umd.edu.pk

Harassment Policy

Sexual or any other harassment is prohibited and is constituted as punishable offense. 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

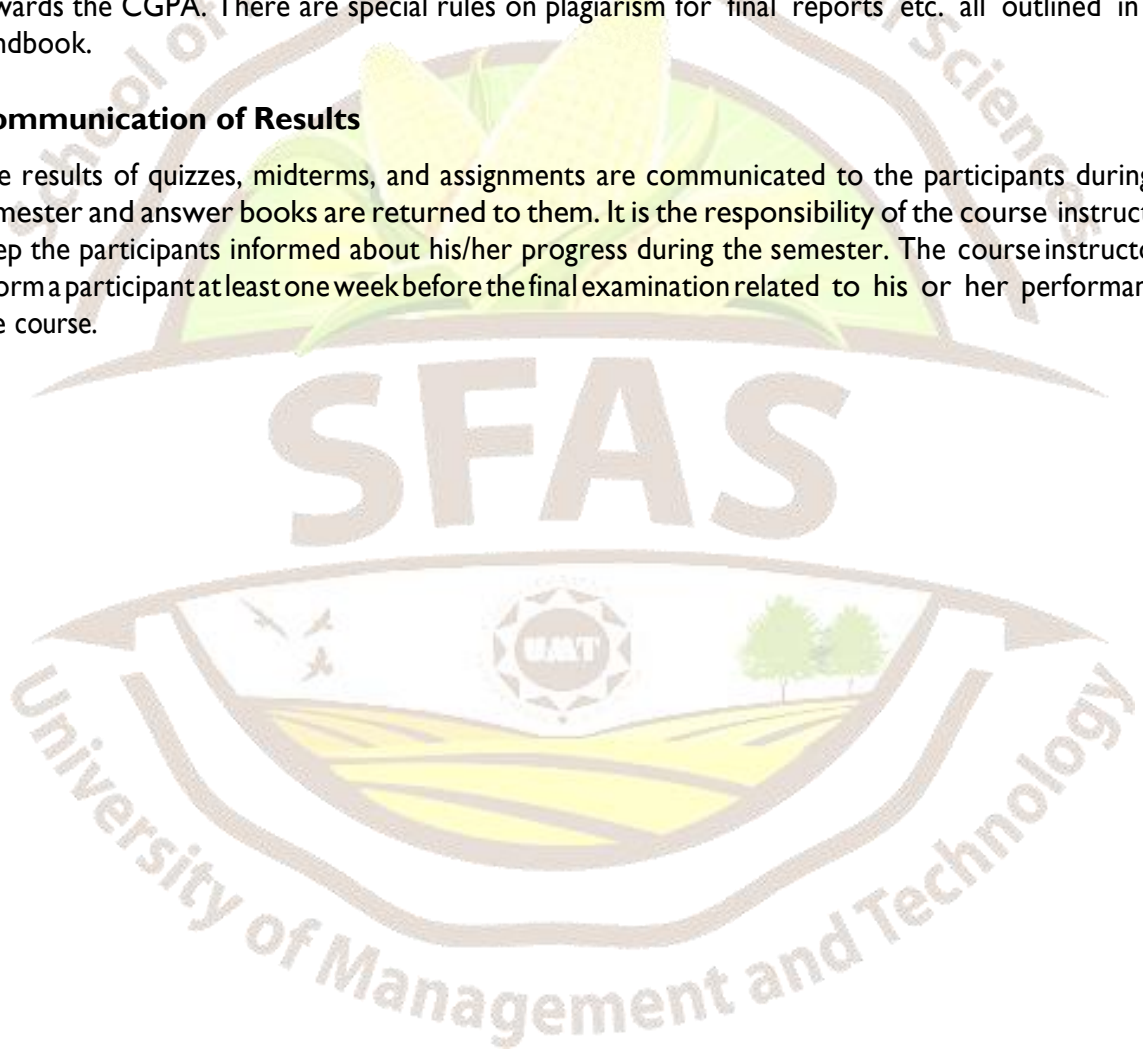
Any participant found using unfair means or assisting another participant during a class test/quiz, assignments or examination would be liable to disciplinary action.

Plagiarism Policy

All students are required to attach a “Turn in” report on every assignment, big or small. Any student who attempts to bypass “Turn in” will receive an “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 a student attempts to cheat “Turn in”, 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-305

Course title: Sugar Technology

Program	BS Food Science and Technology
Credit Hours	3(2-1)
Duration	16 Weeks
Prerequisites (If any)	
Resource Person Name and Email	Rizwan-ur-Rehman rizwan.rehman@umt.edu.pk
Counseling Timing & Room #	3 hours per week (STD 502)
Contact no.	-
Web Links	-

Director Program 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
Class Presentation	10%
Quizzes	5%
Assignments	10%
Class Project	10%
Lab	20%
Mid-Term	15%
Final exam	30%
Total	100%

Recommended Text Books:

1. Peter D. G. (2011). Global Industry, Local Innovation: The History of Cane Sugar Production in Australia. Peter Lang International Academic Publishers.
2. O'Donnell, K. and Kearsley, M. W. (2012). Sweeteners and Sugar Alternatives in Food Technology. John Wiley & Sons, Inc. New York, USA.
3. Konstantinos, D. P. (2015). The Origins of the Sugar Industry and the Transmission of Ancient Greek and Medieval Arab Science and Technology from the Near East to Europe. National and Kapodistriako University of Athens.
4. Panda, H. 2011. Sugarcane processing and by-products of molasses (with analysis of sugar, syrup and molasses). Asia Pacific Business Press Inc., India
5. Carol, A. M. (2014). Sovereign Sugar: Industry and Environment in Hawaii. University of Hawaii Press

Course: Food Characterization

Course code: FT 209

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	Sugar industry in Pakistan	Understand the Production and Demand supply of sugar production	Understand the challenges faced by the Pakistan Sugar industries	Lecture slides Short assignment	Class Participation	Within a Week
2	Sugarcane and sugar beet: Production and Quality	Understand the Production and Demand supply of sugar production.	Understand the production of sugarcane and sugar beet	Lecture Video tutorial	Class Participation	Within a Week
3	Indigenous technology for small scale sugar production	Understand the various production techniques.	Identify the basic techniques involved in indigenous Gur making	Lecture Video tutorial	Class participation Discussion	Within a Week
4	Production of Gur, shaker	Understand the various production techniques	Identify the basic techniques involved in indigenous Gur making	Lecture Literature review	Quiz Class participation	Within a Week

5	Raw sugar manufacturing: unit operations - juice extraction	Understand the various production techniques	Identify different unit operations involved in raw sugar making.	Lecture Literature review Video tutorial	Quiz	Within a Week
6	Raw sugar manufacturing: purification,	Understand the various production techniques.	Understand the working principles and design of different equipments used for the extraction, purification, evaporation, and crystallization the cane juice	Lecture Video tutorial Practical	Lab performance Class participation	Within a Week
7	Raw sugar manufacturing: purification	Understand the various production techniques.	Understand the working principles and design of different equipments used for the extraction, purification, evaporation, and crystallization the cane juice	Lecture Literature review Practical	Case study Class participation	Within a Week
8	Revision & Mid Exams					
9	Raw sugar manufacturing: heating and evaporation	Understand the various production techniques.	Understand the working principles and design of different equipments used for the extraction, purification, evaporation, and crystallization the cane juice	Lecture Class discussions Video tutorial	Quiz Lab Performance	Within a Week

10	Raw sugar manufacturing; crystallization	Understand the various production techniques.	Understand the working principles and design of different equipments used for the extraction, purification, evaporation, and crystallization the cane juice	Lecture Class discussions Video tutorial	Quiz Lab Performance	Within a Week
11	Refining: Affination, clarification, decolorization, Crystallization, Centrifugation	Understand the various production techniques.	Understand the unit operations involved in the refining of raw sugar.	Lecture Class discussions Video tutorial	Quiz Lab Performance	Within a Week
12	Refining: Drying, Bagging, Storage	Understand the Production and Demand supply of sugar production	Understand the unit operations involved in the refining of raw sugar.	Lecture Class discussions Video tutorial	Quiz Lab Performance	Within a Week
13	Factors affecting sugar processing, Quality criteria: raw and refined sugar	Understand the Production and Demand supply of sugar production	Learn different quality criteria and the factors involved in raw sugar production	Lecture Class discussions	Quiz Lab Performance	Within a Week
14	Molasses and other byproducts of sugar making	Have a better understanding of various byproducts that can be manufactured along with sugar production.	Improve the understanding regarding the production of alcohol and other valuable organic compounds produced from molasses	Lecture Lab practical Video tutorial	Whiteboard test Quiz Lab performance	Within a Week



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15	Class presentations and project assessment	To estimate student learning and progress in beverage technology	To develop communication skills and effective communication on industrial floors	Class participation Class projects Q/A session	Class presentation Viva	Within a Week
16	Final Examination	Application of all the concepts learned in beverage technology		On campus examination	Paper and viva	Within a Week
Result Display						

Lab Component

During the course students will be able to perform the following Food Characterization related practical in the laboratory:

1. Asadi, M. 2007. *Beet sugar handbook*. John Wiley & Sons, Inc. New York, USA.
2. Chen, C.C. 2000. *Handbook of sugar refining: a manual for the design and refining facilities*. John Wiley & Sons, Inc. New York, USA.
3. Chen, J.C.P. 2007. *Meade-Chen cane sugar handbook*. John Wiley & Sons, Inc. New York, USA.
4. Lionnet, G.R.E. 1999. *Sugar technology for students*. Lang Fred, Durban, South Africa.
5. Panda, H. 2011. *Sugarcane processing and by-products of molasses (with analysis of sugar, syrup and molasses)*. Asia Pacific Business Press Inc., India

