

Department of Food Sciences
University of the Punjab, Lahore
Course Outline



Programme	B.Sc. (Hons.) Food Science & Technology	Course Code	FST-203	Credit Hours	3(3-0)
Course Title	UNIT OPERATIONS IN FOOD PROCESSING				
Course Introduction					
<p>This course will provide:</p> <ol style="list-style-type: none"> 1. Basic knowledge of unit operations to be carried out at food industry. 2. Basic concepts of specifications of machinery concerning different operations and processes during manufacturing of food. 3. Technical skills for processing of foods at industry. 					
Learning Outcomes					
<p>After completing this course students should be able to:</p> <ol style="list-style-type: none"> 1. Elaborate machine design and technical specifications of machinery used in food processing industry. 2. Demonstrate processing steps used in food industry. 3. Perform different processes at industry. 					
Course Content				Assignments/Readings	
Week 1	Unit-I				
	1.1 Introduction				
	1.2 units				
	1.3 dimensions				
Week 2	Unit-II				
	2.1 conversions				
	2.2 units review				
	2.3 conclusion				
Week 3	Unit-III				
	3.1 Introduction to energy				
	3.2 mass balance				
	3.3 introduction to heat transfer fundamentals				
Week 4	Unit-IV				
	4.1 conduction				

	4.2 convection	
	4.3 radiation	
Week 5	Unit-V	
	5.1 Mass balance	
	5.2 mass balance equations	
	5.3 Pearson's Law	
Week 6	Unit-VI	
	6.1 introduction to air-water mixture	
	6.2 psychometric charts	
	6.3 their application.	
Week 7	Unit-VII	
	7.1 Rheology of food products	
	7.2 introduction to stress	
	7.3 stress	
Week 8	Unit-VIII	
	8.1 stress and deformation	
	8.2 deformation	
	8.3 other aspects.	
Week 9	Unit-IX	
	9.1 introduction to fluids	
	9.2 transport of fluids	
	9.3 transport of fluids through pipes	
Week 10	Unit-X	
	10.1 laminar regimes	
	10.2 turbulent regimes	

	10.3 conclusion	
Week 11	Unit-XI	
	11.1 fluid circulation	
	11.2 porous beds	
	11.3 fluid through porous beds	
Week 12	Unit-XII	
	12.1 introduction to darcy's law	
	12.2 permeability	
	12.3 porosity.	
Week 13	Unit-XIII	
	13.1. fundamentals	
	13.2 maintenance problems	
	13.3 prospects	
Week 14	Unit-XIV	
	14.1 equipments	
	14.2 summary	
	14.3 conclusion	
Week 15	Unit-XV	
	15.1 Introduction to Membranes	
	15.2 Separation processes	
	15.3 Solid-liquid extraction.	
Week 16	Unit-XVI	
	16.1 Solid-liquid extraction.	
	16.2 conclusion	
	16.3 summary	

Textbooks and Reading Material

1. McCabe, W.L., Smith, J.C and Harriott, P. (2016). Unit operations of Chemical Engineering. (7th

ed.). McGraw Hill Inc., New York, USA.

2. Earle, R.L. & Earle, M.D. (2004). Unit operations in Food Processing (Web ed.). The New Zealand Institute of Food Science & Technology. Available at: <http://www.nzifst.org.nz/unitoperations/>.
3. Jeankopolis, C.J. (2004). Transport Processes & Separation Process. Prentice Hall Professional Technical Reference, New Jersey, USA.
4. Gustavo, A & Barbosa-Canovas, V. (2002). Unit Operations in Food Engineering. CRC Press, Taylor & Francis Group, Boca Raton, Florida.

Teaching Learning Strategies

Teaching will be a combination of class lectures, class discussions, and group work. Short videos/films will be shown on occasion.

Assignments: Types and Number with Calendar

The sessional work will be a combination of written assignments, class quizzes, presentation, and class participation/attendance.

Assessment

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2.	Formative Assessment	25%	Continuous assessment includes: Classroom participation, assignments, presentations, viva voce, attitude and behavior, hands-on-activities, short tests, projects, practical, reflections, readings, quizzes etc.
3.	Final Assessment	40%	Written Examination at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.