

Department of Food Sciences

University of the Punjab, Lahore Course Outline



Program	B.Sc. (Hons.) Food Science & Technology	Course Code	FST-206	Credit Hours	3(1-2)
Course Title	Instrumental Techniques in Food Analysis				
Course Introduction					
<p>In this course foods will analyze for purposes of trade, compliance, quality assurance, authentication, complaint investigation, nutritional attributes and scientific research. The students will undertake and compare various food analysis techniques, followed by analysis, interpretation and presentation of the results. The basic knowledge of different analysis concerning to food and food products will be provided. It will include the fundamental concepts of different techniques to analyze food samples of different nature. The core purpose of the course is based on laboratory skills to perform proximate analysis and sensory evaluation of different foods.</p>					
Learning Outcomes					
<p>After completing this course students should be able to:</p> <ol style="list-style-type: none">1. Understand sampling techniques regarding analysis.2. Apply modern instrumental methods to analyze chemical and physical properties of foods.3. Analyze data produced from proximate analysis and sensory evaluation of different foods.					
THEORY					
Course Content					Assignments/ Readings
Week 1	Unit-I 1.1 Food Analysis: Significance				
Week 2	Unit-II 2.1 Sampling Techniques, 2.2 Preparation, preservation.				
Week 3	Unit-III 3.1 Physical properties and analysis of foods and food products 3.2 Appearance, texture, specific gravity, refractive index, rheology.				

Week 4	<p align="center">Unit-IV</p> <p>4.1 Chemical analysis: 4.2 Proximate analysis: moisture, ash, protein</p>	
Week 5	<p align="center">Unit-V</p> <p>5.1 Lipids, carbohydrates, fiber, NFE analysis</p>	
Week 6	<p align="center">Unit-VI</p> <p>6.1 Acidity, pH, sugars analysis</p>	
Week 7	<p align="center">Unit-VII</p> <p>7.1 Mineral elements, vitamins analysis</p>	
Week 8	<p align="center">Unit-VIII</p> <p>8.1 Microbial analysis 8.2 Importance, media preparation, sterilization, dilution of samples, pouring of media</p>	
Week 9	<p align="center">Unit-IX</p> <p>9.1 Instrumental techniques: 9.2 Principles, instrumentation, applications.</p>	
Week 10	<p align="center">Unit-X</p> <p>10.1 Sample preparation. 10.2 Supercritical fluid extraction, Chromatography: TLC, ion chromatography,</p>	
Week 11	<p align="center">Unit-XI</p> <p>11.1 Gas Chromatography, 11.2 High Performance Liquid Chromatography, 11.3 LCMS</p>	
Week 12	<p align="center">Unit-XII</p> <p>12.1 Spectroscopy: UV-VIS, atomic emission and absorption,</p>	
Week 13	<p align="center">Unit-XIII</p> <p>13.1 Infrared - FTIR, 13.2 NIR, NMR</p>	
Week 14	<p align="center">Unit-XIV</p> <p>14.1 Electrophoresis: 14.2 Types, principles, applications</p>	

Week 15	Unit-XV 15.1 Sensory evaluation of foods 15.2 Attributes, difference and preference tests, consumer acceptance	
Week 16	Unit-XVI 16.1 Analytical data: 16.2 Evaluation, interpretation, statistical applications.	
PRACTICAL		
Course Content		Assignments/ Readings
Week 1	Lab safety requirements. Preparation and standardization of laboratory solutions. Sampling: preparation of sample for analysis.	
Week 2	Physicochemical analysis Determination of specific gravity, refractive index, moisture, ash.	
Week 3	Determination of crude protein, crude fat, crude fiber, NFE	
Week 4	Determination of pH and acidity. Paper and thin layer chromatography. Identification of toxins by TLC.	
Week 5	Estimation of food components UV-VIS spectrophotometer	
Week 6	Microbiological analysis Measurement of total plate count, coliform and salmonella	
Week 7	Mineral analysis by flame photometer and atomic absorption spectrophotometer.	
Week 8	Determination of organic acids by chromatography.	
Week 9	Determination of volatile compounds by gas chromatography	

Week 10	Identification of food components by FTIR	
Week 11	Protein characterization by electrophoresis.	
Week 12	Estimation of Amino Acids profile by amino analyzer	
Week 13	Estimation of fatty acids profile by GC-MS	
Week 14	Measurement of minerals by flame photometer	
Week 15	Sensory evaluation of foods.	
Week 16	High tech laboratory/food industry visit	
Textbooks and Reading Material		
<ol style="list-style-type: none"> 1. AOAC. (2019). Official Methods of Analysis of AOAC, 21st Edition. Association of Official Analytical Chemists, Arlington, USA. 2. Otles, S. (2009). Handbook of Food Analysis Instruments. CRC Press, Taylor & Francis Group, Boca Raton, Florida, USA. Winton, A. & Winton, K.B. (2006). Techniques of Food Analysis. Agrobios Publishing Co., Jodhpur, India. 3. Awan, J.A. & Rehman, S.U. (2003). Food Analysis Manual. Unitech Communications, Faisalabad, Pakistan. 4. Nielson, S.S. (2003). Food analysis, Kluwer Academic/Plenum Pub., New York, USA Pomeranz, Y. & Meloan, C.E. (2000). Food Analysis: Theory and Practice. CBS Publishers, New Delhi. Lawless, H.T. & Haymann, H. (1998). Sensory Evaluation of Food: Principles and Practices. Chapman and Hall, New York, USA 		
Teaching Learning Strategies		
<ol style="list-style-type: none"> 1. Lectures 2. Class discussions 3. Quizzes 4. Assignments 5. Practical performance 6. Presentations 		
Assignments: Types and Number with Calendar		
<ol style="list-style-type: none"> 1. The main evaluation will be done for sessional mark by the practical performance of the students in the laboratory. 2. The sessional work will also 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.