GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code: 3161411
Food Analytical techniques
VIth SEMESTER

Type of course: Professional Elective Course

Prerequisite: Nil

Rationale: The subject is designed to build the scientific food analysis approach among students. The course provides clear understanding of principles and working operations of various instruments that are commonly used in food industry and food research labs to characterize the structure physical and chemical properties of food components. Exposure to sophisticated instruments like FTIR, NMR, GC and HPLC will enhance the food analytical skill.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	2	4	70	30	30	20	150

S.No	Topics	Teaching Hrs	Module Weightage (%)
1.	Introduction to Food Analysis Selection of analysis methods and samples, Steps in analysis, Method validity, Introduction to AOAC, AACC, AOCS, Codex Alimentarius Commission, National Standards Authority	04	10
2.	Sampling and Sample Preparation Selection of sampling procedures, Problems in Sampling, Sample preparation	02	6
3.	Compositional analysis of food Moisture analytical techniques- Oven drying, Vacuum oven, Distillation, Karl Fischer Method, Dielectric Method Ash Analysis – Dry Ashing, Wet Ashing, Microwave ashing Fat Analysis – Continuous and Batch Solvent Extraction, Gerber Method for milk fat Protein Analysis – Kjeldahl Method, Dumas Method, Infrared Spectroscopy, Biuret Method, Lowry Method Carbohydrate Analysis: Phenol Sulphuric acid method, Somogyi-Nelson Method	10	26
4.	Principle and Working of Instruments: pH meter, Electrophoresis unit, Atomic Absorption Spectroscopy, Inductively coupled plasma-Atomic Emission spectroscopy, FTIR Spectroscopy, Nuclear Magnetic Resonance Spectroscopy	10	26
5.	Chromatography Techniques and applications in food industry Introduction to Chromatography, Paper Chromatography, Thin layer chromatography, Gas Chromatography, High Performance Liquid Chromatography	12	32

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
25	25	20	20	10	0

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1. Wilson, R.H. (Ed). 1994. Spectroscopic techniques for food analysis. New York: VCH Publishers, Inc.
2. R.P.Braun 2014. Introduction to Instrumental Analysis. PharmaMed Press A Unit of BSP Books Pvt. Ltd. Hyderabad
3. S. Suzanne Neilsen. Food Analysis 4th Edition. Springer New York
4. Principles of Instrumental Analysis 7th Edition by Douglas A. Skoog (Author), F. James Holler (Author), Stanley R. Crouch (Author). Cengage Learning
5. Winton A.L. & Winton K.B. Techniques of Food Analysis. Agrobios Publications

Course Outcome:

At the end of this module, the student will be able to:

Sr. No.	CO statement	Weightage (%)
CO-1	Understand the scientific way for analytical method selection and steps involved	15
CO-2	Understand food sampling and sample preparation before subjecting for actual analysis	15
CO-3	Understand compositional analysis of food for macronutrients and other major components	25
CO-4	Comprehend principles, working and applications of advanced instruments in food analysis	25
CO-5	Conceptualize different types of chromatography techniques and their applications in food analysis	20

List of Experiments:

1. Determination of moisture in a food product by hot air oven drying, vacuum oven drying and infrared moisture analyser and comparing the results
2. Demonstration of Karl Fischer Instrument
3. Determination of ash and acid insoluble ash in cereal flour
4. Determination of protein content by Biuret Method
5. Study of spectrophotometer and pH meter
6. Protein characterization by electrophoresis

7. Demonstration of Fourier Transform IR spectroscopy
8. Demonstration of Nuclear Magnetic Resonance spectroscopy
9. Demonstration of paper chromatography
10. Demonstration of thin layer chromatography

Major Equipments & Instruments

a. Karl Fischer Instrument
b. Hot air and Vacuum oven
c. Muffle furnace
d. Electrophoresis unit
e. Spectrophotometer
f. Analytical Weighing balance
g. Semi automatic Protein analyser
h. Fat analyser
i. Fiber analyser

List of Open Source Software/learning website:

1. http://foodscience.uark.edu/
2. http://fssai.gov.in/manuals
3. http://fao.org/fao-who-codexalimentarius
4. www.who.int/foodsafety