



Course Specifications

Course Title:	Laboratory Techniques in Food Sciences and Nutrition
Course Code:	2064102-3
Program:	Bachelor in Food Science and Nutrition
Department:	Food Sciences and Nutrition Department
College:	College of Science
Institution:	Taif University

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A. Course Identification:

1. Credit hours: 3 Hours
2. Course type
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: 9 th level/ 3 rd year
4. Pre-requisites for this course (if any): Analytical Food chemistry (1) 2062106-3
5. Co-requisites for this course (if any): None

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	5	100%
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	30
2	Laboratory/Studio	20
3	Tutorial	---
4	Others (specify)	---
	Total	50

B. Course Objectives and Learning Outcomes:

1. Course Description

This course deals with studying of the principles and applications of the laboratory techniques applied in food sciences and nutrition. The course provides basic understanding of the principles, instrumentation and applications of chemical analysis and body composition assessment. This course provides students with an overview of spectroscopic and electrochemical techniques appropriate for the modern chemical analysis laboratory. Develop the basic knowledge of spectrophotometric, atomic spectrometry, polyacrylamide gel electrophoresis (PAGE), ELIZA, Gel filtration, Ion exchange and ion selective electrodes (ISEs) as analytical techniques as well as explaining their application in quality control fields particularly in food science. Knowledge the methods and instruments of body composition assessment.

2. Course Main Objective:

- 1) Differentiates the basic principles and modern laboratory techniques applied in food sciences and body composition assessment.
- 2) Learn the fundamental of the main chromatographic analysis methods and the fundamental and applications of ion selective electrode technique in food analysis.
- 3) Demonstrate the ability to choose appropriate instrumentation for solving various analytical problems.
- 4) Recognize the effect of various laboratory techniques on food quality and body composition assessment

3. Course Learning Outcomes:

CLOs		Aligned PLOs
1	Knowledge and understanding	
1.1	Describe the fundamentals of the main food instrumental analytical and body composition assessment techniques.	K 3
1.2	Define the basic principles and applications of instrumental food analysis and body	K 4

CLOs		Aligned PLOs
	composition assessment techniques.	
2	Skills:	
2.1	Apply different methods to determine the food component and body composition assessment by different instruments.	S 1
2.2	Study the effect of various laboratory techniques on food quality and body composition assessment.	S 5
3	Values:	
3.1	Cooperate and development the learning process and the continuous development of personal and professional skills	V1
3.2	Support the project of his group by using different presentation tools.	V1

C. Course Content

No	List of Topics	Contact Hours
1	Introduction to basic laboratory techniques - pH meters and electrodes	3
2	Principles of spectroscopic analysis.	3
3	Spectrophotometers (UV and IR waves) - Flame photometers	3
4	Ion selective electrodes - Atomic absorption	3
5	Principles of Electrochemical analysis- Electrochemical cell- Supporting electrolytes.	3
6	Mercury electrodes, Solid electrodes - Metal Electrodes Pt and gold- Working electrodes - Ion selective electrodes.	3
7	Principles of chromatographic analysis technique - Gas Chromatography GC: Principles, Aim, Instrumentation, Application	3
8	Liquid Chromatography HPLC: Principles, Aim, Instrumentation, Application	3
9	Ion exchange chromatography technique	3
10	Electrophoresis (PAGE) techniques	3
Total		30
Experimental Topics		
1	* Laboratory safety guidelines and lab facilities.	2
2	* Practical application on pH meters (calibration and determination).	2
3	* Practical applications on spectrophotometers	2
4	* Practical applications on flame photometers	2
5	* Practical applications on atomic absorption	2
6	* Practical applications on ion selective electrodes	2
7	* Practical applications on Gel filtration	2
8	* Protein purification by polyacrylamide gel electrophoresis (PAGE)	2
9	*HPLC technique	2
10	* Protein purification by ELIZA.	2
Total		20

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding		
1.1	Describe the fundamentals of the main food instrumental analytical and body composition assessment techniques.	- Lecture	- Written exam
1.2	Differentiates the basic principles and applications of instrumental food analysis and body composition assessment techniques.	- Lecture - Practical part	- Written exam
2.0	Skills		
2.1	Apply different methods to determine the food component and body composition assessment by different instruments	- Practical reports	- Practical exam - Portfolios
2.2	Study the effect of various laboratory techniques on food quality and body composition assessment.	- Lecture - Practical part	- Written exam - Practical exam
3.0	Values		
3.1	Cooperate and development the learning process and the continuous development of personal and professional skills	- Practical experiments	- Evaluation the student Assignment
3.2	Support the project of his group by using different presentation tools.	- Term papers activities	- Evaluation the researches of each group

2. Assessment Tasks for Students:

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Assignment and Interaction during lectures	Continues	10%
2	Midterm exam	5-6	20%
3	Weekly Lab. Reports	Continues	20%
4	Practical exam	11	10%
5	Final exam	12	40%

*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- There are 6 h per week for this purpose and the students know these hours according to the time of professor who teach the course through What Sapp, e-mail and Blackboard.
- Student satisfaction surveys are conducted for academic guidance.
- Develop an improvement plan for academic guidance based on the results of the questionnaire analysis

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	<ol style="list-style-type: none"> Nielsen, S. S. (2009). Food analysis. 4th edition, Springer New York Dordrecht Heidelberg London Richardson, G.H. (1985). Standard methods for the examination of dairy products. 15th ed. American public health association, Washington, D.C. James C.S. Analytical Chemistry of Foods. Blackie Academic & Professional. London, NY, Tokyo, Melbourne, 1995.
Essential References Materials	<ol style="list-style-type: none"> Principles of instrumental analysis 6th ed., D.A. Skoog and F.J. Holler and S.R. Crouch, Canada, (2007). Modern Chemical Analysis and Instrumentation, H. F. Walton & J. Reyes, (1980). Applied Body Composition Assessment, Vivian H. Heyward, Dale R. Wagner. 2nd ed, Human Kinetics, 2004. Analytical Chemistry - Automated Analysis, Prof. Dr. Jihad Diab – 2021. Automated analysis of electrical and spectroscopic methods - International Publishing, 1st ed – 2003. Analytical Chemistry, Automated Analysis, a. Dr. Ibrahim Al-Zamil, Al-Khuraji Publishing - 1421 H.
Electronic Materials	<p>- J. Assoc off. anal. Chem. - Anal. Chem.</p> <p>- Scientific Journals in Food Science and Nutrition field.</p>
Other Learning Materials	<p>www.britannica.com/EBchecked/topic/183000/electrochemicalanalysis</p> <p>www.chm.davidson.edu/vce/Spectrophotometry/index.html</p> <p>www.fao.org – www.nutrition.org – www.sciencedirect</p>

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	<ul style="list-style-type: none"> - Classroom (capacity not more than 40 students) for 3 h/week. - Laboratory Techniques in Life Sciences Lab (capacity not more than 20 students) for 3 h/week
Technology Resources (AV, data show, Smart Board, software, etc.)	<ul style="list-style-type: none"> - Data Show projectors, smart blackboard. - Computer Portable PowerPoint presentations to special lectures.
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	<ul style="list-style-type: none"> - Data Show projectors, smart blackboard. - Computer Portable PowerPoint presentations to special lectures.

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Students, faculty, program leaders and Peer Reviewer	<ul style="list-style-type: none"> • Continuous monitoring by directors of program and quality assurance unit (Direct). • Applying Questionnaires received from the Deanship of Academic Development for Student evaluation (indirect). • Evaluation of course report (indirect).
Extent of achievement of course learning outcomes	Students, faculty, program leaders and Peer Reviewer	<ul style="list-style-type: none"> • Applying Questionnaires for Student evaluation (indirect). • Evaluation of course report

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Quality of learning resources	Faculty, program leaders, administrative staff, independent reviewers.	(indirect). <ul style="list-style-type: none"> • Continuous monitoring by directors of program and quality assurance unit (Direct). • Applying Questionnaires for Student evaluation (indirect). • Evaluation of course report (indirect).

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	Department council - Academic Development Committee	
Reference No.	Department council NO: 5	Subject NO: 2
Date	08 /07 /1444 H	