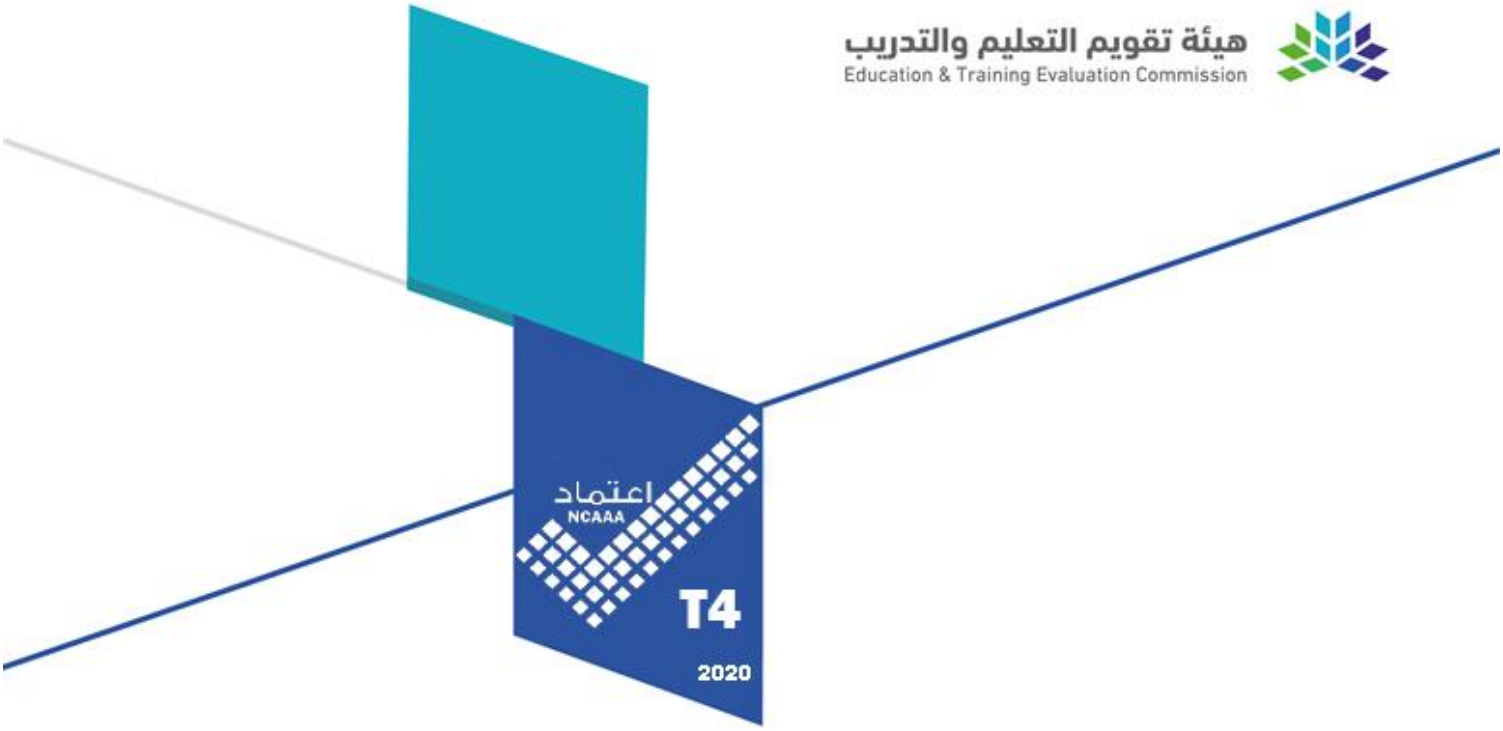
هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission



Course Specifications

Course Title:	**Analytical Food chemistry (1)**
Course Code:	**2062106-3**
Program:	**Bachelor in Food Science and Nutrition**
Department:	**Food Sciences and Nutrition Department**
College:	**College of Science**
Institution:	**Taif University**

Table of Contents

A. Course Identification:

1. Credit hours: 3 Hours
2. Course type **a.** University ☐ College ☐ Department ☑ Others ☐ **b.** Required ☑ Elective ☐
3. Level/year at which this course is offered: 6th Level/2nd year
4. Pre-requisites for this course (if any)**: General chemistry 1 (204101-4)**
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**	√	100%
2	**Blended**	---	---
3	**E-learning**	---	---
4	**Distance learning**	---	---
5	**Other**		

7. Contact Hours (based on academic semester)

No	---	---
1	**Lecture**	30
2	**Laboratory/Studio**	30
3	**Tutorial**	---
4	**Others** (specify)	---
	Total	**60**

B. Course Objectives and Learning Outcomes

1. Course Description

Principles of qualitative and quantitative analysis-Tools used in analytical chemistry- Chemical calculations in volumetric analysis-Representing concentration -Introduction to volumetric analysis-Types of reactions in volumetric analysis - Types of indicators- Titration curves - Principles of Oxidation - reduction reactions- Types of indicators in redox reactions- Principles of Precipitation titration- Principles of Complexmetric reactions-Types of indicators, Applications-Principles of Gravimetric analysis and its applications - Introduction of food analysis, Definition, Aims, Studying physical and chemical properties of food, quality attributes and quality control, food standard specifications, fitness for human consumption, food safety, food hygiene, food adulteration methods-Preparation of representative sample for chemical analysis- - Food composition Data. Studying of the exact composition of food using microscopic examination- The importance of nutritional Examinations.

2. Course Main Objective

1) This course covers the general basics of Analytical Chemistry, Volumetric, Oxidation – reduction - Precipitation titration - Complexmetric reactions- Gravimetric analysis.
2) Introduction of food analysis, Definition, Aims, studying physical and chemical properties of food, quality attributes and quality control, food standard specifications, fitness for human consumption, food safety, food hygiene, food adulteration methods- Studying of the exact composition of food using microscopic examination- The importance of nutritional Examinations.
3) Follow up the recent advances in the field of Analytical Chemistry by continuously visit the official web sites of the national and international organizations interested in Analytical Chemistry.

3. Course Learning Outcomes:

CLOs		Aligned PLOs
1.0	**Knowledge and understanding**	
1.1	Define the fundamentals of chemical analysis (qualitative and quantitative analysis)	**K1**
1.2	Recognize the different methods to express concentration of solution.	**K1**

CLOs		Aligned PLOs
1.3	Memorize the properties of the precipitates, Organic and inorganic precipitating agents and Complex metric titrations	**K2**
1.4	Studying the exact composition of food using microscopic examination. Recognize the importance of nutritional Examinations.	**K3**
2.0	**Skills:**	
2.1	Compare the differences between the volumetric and gravimetric methods.	**S1**
2.2	classify some chemical terms associated with volumetric, gravimetric and Complexmetric analysis and clasify the suitable indicator in each type of volumetric reactions.	**S3**
2.3	Preparation of representative sample for chemical analysis.	**S5**
3.0	**Values:**	
3.1	Cooperate in the learning process and the continuous Cooperation of personal and professional skill	**V1**
3.2	Support the project of his group by applying different presentation tools.	**V1**
3.3	Participate in solving chemical problems related to volumetric and gravimetric analysis	**V 2**

C. Course Content:

No	List of Topics	Contact Hours
1	Introduction to Analytical Chemistry, Classification, The principles of qualitative and quantitative methods of analysis.	3
2	Tools of analytical chemistry, Different methods to express the concentration of solution, Molarity, molality, normality, strength, percentage concentration, part per million (ppm), part per billion (ppb) and, part per trillion (ppt), Chemical calculations in volumetric analysis - preparation of standard solutions.	3
3	Primary and secondary standard substances and their characteristics. The various types of errors in chemical analysis and the estimation of experimental error. The treatment of analytical data and use of statistics for evaluating results	3
4	Acid-base indicators, Acid-base titrations, Titration curves, Calculation of pH. Precipitation titrations, Precipitation equilibrium, types of equilibrium and factors affecting equilibrium constant, Solubility and Solubility product. Applications (Mohr method, Volhard method , and Fajan's method).	3
5	Oxidation-reduction reactions, Oxidation reduction indicators – Determination of the end point in Redox titrations using KMnO4 and K2Cr2O7 - Iodo- and Iodimetric Titrations “Applications on Redox Reactions.	3
6	Calculations in gravimetric analysis – Requirements of the precipitated and weighted forms, Applications in gravimetric analysis.	3
7	Complexmetric Titrations, Different types of ligands, Complexmetric Indicators, The factors affecting the stability of complex formed, Masking and de-masking agents, Applications.	3
8	Introduction of food analysis, Definition, Aims, Studying physical and chemical properties of food, quality attributes and quality control, food standard specifications, fitness for human consumption, food safety, food hygiene, food adulteration methods	3
9	Preparation of representative sample for chemical analysis. Food composition Data. Studying of the exact composition of food using microscopic examination.	3
10	The importance of nutritional Examinations.	3
Total		**30**
	Experimental Topics	
1	Laboratory safety guidelines, lab report and lab facilities.	3
2	* Different methods for representing concentration of solution. * Applications on preparation of standard solutions.	3
3	*Standardization of hydrochloric acid (HCl) solution using 0.1 N sodium carbonate (Na2CO3) solution using M.O and ph.ph as indicators.	3

4	*Determination of the normality and strength of NaOH solution using 0.1 N standard solution of HCl.	3
5	* Determination of the % of purity of a mixture of NaOH and Na2CO3 solutions using 0.1 N standard solution of HCl * Determination of ammonia NH3 in ammonia solution NH4OH using 0.1 N standard solution of HCl.	3
6	* Precipitation Reactions, Applications on Volhard and Mohr s Methods "Determination of chloride ion by titration against AgNO3 "	3
7	* Standardization of potassium permanganate solution using standard solution of oxalic acid * Application of Iodo- and Iodimetry for the determination of Iodine solution using sodium thiosulfate solution.	3
8	* Complexmetric Titrations "Determination the % of purity of MgSO4 solution using 0.01 M EDTA solution" . * Complexmetric Titrations "Determination the % of purity of ZnSO4 solution using 0.01 M EDTA solution"	3
9	* Complexmetric Titrations "Determination the % of purity of binary and ternary mixtures using 0.01 M EDTA solution"	3
10	* Determination of water of crystallization in hydrated barium chloride sample * Determination of barium as barium sulfate	3
Total		**30**

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	Define the fundamentals of chemical analysis (qualitative and quantitative analysis)	Lecture.	Written exam
1.2	Recognize the different methods to express concentration of solution.	Lecture - Practical demonstrations	Written exam - Practical exam
1.3	Memorize the properties of the precipitates, Organic and inorganic precipitating agents, and Complex metric titrations	Lecture	Written exam
1.4	Studying the exact composition of food using microscopic examination. Recognize the importance of nutritional Examinations.	Lecture	Written exam
2.0	**Skills**		
2.1	Compare the differences between the volumetric and gravimetric methods.	Write a short search	Written exam Report evaluation
2.2	Explain some chemical terms associated with volumetric, gravimetric and Complexmetric analysis. Explain how to select the suitable indicator in each type of volumetric reactions.	Lecture - Practical demonstrations	Written exam Practical exam
2.3	Preparation of representative sample for chemical analysis.	Lecture - Practical demonstrations	Written exam Practical exam
3.0	**Values**		
3.1	Cooperate in the learning process and the continuous Cooperation of personal and professional skill	Practical lessons	Report evaluation
3.2	Support the project of his group by applying different presentation tools.	Practical experiments	Report evaluation
3.3	Participate in solving chemical problems related to volumetric and gravimetric analysis	Practical experiments	Report evaluation

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.
- 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	-Analytical Chemistry, Gary D Christian, Wiley; 6th ed., 2003. -Analytical Chemistry, An Introduction, Thomson Learning 7th ed. 1999. -Douglas A. Skoog, Donald M. West, James F. Holler and Stanley R. Crouch, Analytical Chemistry, 7th edition, Springer (2014).- Prakash -Singh Bisen (2014): Laboratory Protocols in Applied Life Sciences. CRC Press, Taylor and Francis Group. - Analytical Chemistry- Automated Analysis, Prof. Dr. Jihad Diab – 2021.
Essential References Materials	- Vogel's Textbook of Quantitative Chemical analysis, G. H. Jefeery, J. Bassett, J. Mendham, and R. C. Denney, John Wiley & Sons, 1989. - Modern analytical chemistry, David Harvey, 1st ed., 1956. - Chemistry of Food Analysis " Principles and Applications ", Prof. Dr. Mohamed Amen Abdulla-2002. - Food Chemistry, Damascus, Syria- 2010
Electronic Materials	1. Sciencedirect.com 2. PubMed. 3. Springer. https://www.nature.com/subjects/analytical chemistry https://www.royalsocietyof chemistry.org/
Other Learning Materials	www.britannica.com/EBchecked/topic/183000/electrochemicalanalysis www.chm.davidson.edu/vce/Spectrophotometry/index.html www.fao.org –www.nutrition.org- www.sciencedirect

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	- Classroom (capacity not more than 40 students) for 3 h/week. - Analytical Chemistry Lab (capacity not more than 20 students) for 3 h/week
Technology Resources (AV, data show, Smart Board, software, etc.)	- 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)	- 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	• 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	• Applying Questionnaires for Student evaluation (indirect). • Evaluation of course report (indirect).
Quality of learning resources	Faculty, program leaders, administrative staff, independent reviewers.	• 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: 2 Subject NO: 1**
Date	**30 /02 /1444 H**