



**ATTACHMENT 2 (e)**

**Course Specifications**

**Kingdom of Saudi Arabia**

**The National Commission for Academic Accreditation & Assessment**

# **Separation Methods and Thermal Analysis**

## **4023562-3**

**Course Specifications  
(CS)**





### Course Specifications

Institution: <b>Umm Al-qura University</b>	Date of Report: <b>2017</b>
College/Department : <b>Faculty of Applied Science/ department of chemistry</b>	

#### A. Course Identification and General Information

1. Course title and code: <b>Separation Methods and Thermal Analysis / 4023562-3</b>			
2. Credit hours: <b>3 hrs</b> (2 theoretical + 1 practical )			
3. Program(s) in which the course is offered. <b>Chemistry and Industrial Chemistry</b>			
4. Name of faculty member responsible for the course: <b>Dr. Mohammed Kassem</b>			
5. Level/year at which this course is offered: <b>6<sup>th</sup> level / 3<sup>rd</sup> year</b>			
6. Pre-requisites for this course (if any): <b>Spectrophotometric and Electrochemical techniques 402311-3</b>			
7. Co-requisites for this course (if any)---			
8. Location if not on main campus: <b>both on El-Abedyah, and El-Zaher</b>			
9. Mode of Instruction (mark all that apply)			
a. Traditional classroom	<input checked="" type="checkbox"/>	What percentage?	<b>100%</b>
b. Blended (traditional and online)	<input type="checkbox"/>	What percentage?	<input type="text"/>
c. e-learning	<input type="checkbox"/>	What percentage?	<input type="text"/>
d. Correspondence	<input type="checkbox"/>	What percentage?	<input type="text"/>
f. Other	<input type="checkbox"/>	What percentage?	<input type="text"/>
Comments:			



## B Objectives

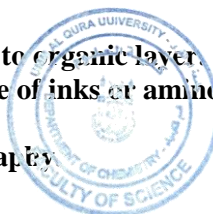
<p>1. What is the main purpose for this course? <b>By the end of this course the students will</b></p> <ol style="list-style-type: none"> <li>1- Have all information about mixtures in chemistry</li> <li>2- Familiar with separation process and methods of thermal analysis.</li> <li>3- Able to use many separation tools for separate both organic and inorganic mixtures.</li> </ol>
<p>2. Briefly describe any plans for developing and improving the course that are being implemented. (e.g. increased use of IT or web based reference material, changes in content as a result of new research in the field)</p> <p><b>The students will be mentioned to prepare an essay or a report from literature using the library, data base services, and/or websites to follow up and update the new topics of the subject of the course</b></p>

**C. Course Description (Note: General description in the form to be used for the Bulletin or handbook should be attached)**

1. Topics to be Covered		
List of Topics	No. of Weeks	Contact Hours
1. Separation methods in analytical chemistry, classifications , and solvent extraction technique	2	4
2. Principles of chromatographic methods and its classification	1	2
3. Column chromatography	1	2
4. Liquid-liquid chromatography and Solid-liquid chromatography	1	2
5. Ion exchanger chromatography, ionic chromatography and HPLC	1	2
6. Plane chromatography	1	2
7. Thin layer chromatography (TLC), paper chromatography (PC) and electrophoresis method	1	2
8. Gas chromatography	2	4
9. Gas chromatography in qualitative, quantitative, medical and petroleum analysis	1	2
10. Principles and devices of previous analysis methods	1	2
11. Thermal analysis methods: thermo gravimetric analysis (TGA), (DTG), (DSC) and (DTA)	1	2
12. Calometric analysis and thermal titrations	1	2

### Laboratory Part:

- Solvent extraction of iodine from aqueous layer to organic layer.
- Choosing suitable solvent for separation mixture of inks or amino acids using paper chromatography.
- Halides separation using thin layer chromatography.



- Determination of total concentration of cations in water sample using ion-exchange chromatography.
- Using GC to determine retention time, flow rate and internal standard solution then determine pentanol in unknown sample.
- Chemical equilibrium measurement using GC for the reaction of methyl acetate with ethyl alcohol.
- Determination fatty acid by GC.
- Determination of alcohol by GC.
- Determination of benzoic acid in beverages by GC.
- Determination of drugs in pharmaceuticals using HPLC.



2. Course components (total contact hours and credits per semester):						
	Lecture	Tutorial	Laboratory	Practical	Other:	Total
Contact Hours	28	-	42			70
Credit	2	-	1			3

3. Additional private study/learning hours expected for students per week.	2 h
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4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategy

	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
<b>1.0</b>	<b>Knowledge</b>		
1.1	Recognize the separation methods in analytical chemistry, classifications, and solvent extraction technique	<ul style="list-style-type: none"> <li>• Lectures</li> <li>• Scientific discussion</li> <li>• Library visits</li> <li>• Web-based study</li> </ul>	<ul style="list-style-type: none"> <li>• Exams</li> <li>• web-based student performance systems</li> <li>• portfolios</li> <li>• long and short essays</li> <li>• posters lab manuals</li> </ul>
1.2	Identify the principles of chromatographic methods and its classification		
1.3	Know the principles of column chromatography		
1.4	Describe liquid-liquid chromatography and Solid-liquid chromatography		
1.5	Familiar with plane chromatography		
1.6	Select the proper method of preparation of an organic molecule		
1.7	Name the different conformations of alkanes and cycloalkanes		
1.8	Determine principles and devices of previous analysis methods		
1.9	Recognize thin layer chromatography (TLC), paper chromatography (PC) and electrophoresis		



	method		
1.1 0	Memorize the thermal analysis methods		
1.1 1	Outline calometric analysis		
1.1 2	Define thermal titrations		
<b>2.0</b>	<b>Cognitive Skills</b>		
2.1	Apply separation methods in analytical chemistry	<ul style="list-style-type: none"> <li>• Lectures</li> <li>• Scientific discussion</li> <li>• Library visits</li> <li>• Web-based study</li> </ul>	<ul style="list-style-type: none"> <li>• Exams</li> <li>• web-based student performance systems</li> <li>• portfolios</li> <li>• posters</li> <li>• demonstrations</li> </ul>
2.2	Compare calometric analysis and thermal titrations		
2.3	Explain the principles of chromatographic methods and its classification		
2.4	Analyze liquid-liquid chromatography and Solid-liquid chromatography		
2.5	Summarize the principles and devices of GC and HPLC		
<b>3.0</b>	<b>Interpersonal Skills &amp; Responsibility</b>		
	<ul style="list-style-type: none"> <li>• Ability to work in a team to perform specific experimental tasks.</li> <li>• Ability to work independently to handle chemicals</li> <li>• Ability to communicate results of work to classmate and participation in class or ab oratory discussions</li> </ul>	<ul style="list-style-type: none"> <li>• Class discussions</li> <li>• Research activities</li> </ul>	<ul style="list-style-type: none"> <li>• Performance on in-practical exams.</li> <li>• Work on research activity.</li> <li>• Overall student performance in Lab. discussions</li> <li>• Cross questions after finishing laboratory work</li> </ul>
<b>4.0</b>	<b>Communication, Information Technology, Numerical</b>		
	<ul style="list-style-type: none"> <li>• Use information and communication technology.</li> <li>• The ability to use e-mail to communicate with the instructor and other students.</li> <li>• Scientific writing.</li> <li>• Use his/her observations to solve problems.</li> <li>• Able to calculate and discuss the facts and logical propose methods to solve the difficulties.</li> </ul>	<ul style="list-style-type: none"> <li>• Lectures</li> <li>• Scientific discussion</li> <li>• Library visits</li> <li>• Web-based study</li> </ul>	<ul style="list-style-type: none"> <li>• web-based student performance systems</li> <li>• individual and group presentations</li> </ul>
<b>5.0</b>	<b>Psychomotor</b>		
	Laboratory practice . including 1.Locate Materials Safety Data Sheets, chemicals	Practical session should include both	1.Repetition of the experiments , to reproduce



<p>carcinogens list, and hazardous chemicals list. 2. Handle chemicals safely with a proper PPE 3. Dilute solutions, repeat analysis and calculate true result for all procedures performed as required. 4. Pipette accurately at all times 5. Titrate and weight efficiently in right way 6. Dispose the hazardous solution in right way</p>	<p>demonstration and experiments.</p>	<p>the results 2. Written report of chart and procedures. 3. The students should be able to correlate their results with experimental conditions</p>
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5. Schedule of Assessment Tasks for Students During the Semester			
	Assessment task (e.g. essay, test, group project, examination, speech, oral presentation, etc.)	Week Due	Proportion of Total Assessment
1	Homework or activities.	--	10 %
2	Midterm Exam.	8	20 %
3	Practical Exam.	14	30 %
4	Final Exam. (2hours Exam)	16	40 %
5	<b>Total</b>		<b>100 %</b>

#### D. Student Academic Counseling and Support

<p>1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice. (include amount of time teaching staff are expected to be available each week)</p> <ul style="list-style-type: none"> <li>• <b>We have faculty members to provide counseling and advice.</b></li> <li>• <b>Office hours: During the working hours weekly.</b></li> <li>• <b>Academic Advising for students.</b></li> </ul>
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#### E. Learning Resources

<p>1. List Required Textbooks</p> <ul style="list-style-type: none"> <li>• Douglas A. Skoog, Donald M. West, James F. Holler and Stanley R. Crouch, <i>Analytical Chemistry</i>, 7th edition, Springer (2014)</li> </ul>
<p>2. List Essential References Materials (Journals, Reports, etc.)</p> <ul style="list-style-type: none"> <li>• Lecture Hand outs available on the coordinator website</li> </ul>
<p>3. List Recommended Textbooks and Reference Material (Journals, Reports, etc)</p> <ul style="list-style-type: none"> <li>• Gary D. Christian, Purnendu K. Dasgupta and Kevin A. Schug, <i>Analytical Chemistry</i>, 7th edition, WILEY (2014)</li> </ul>
<p>4. List Electronic Materials (eg. Web Sites, Social Media, Blackboard, etc.)</p> <ul style="list-style-type: none"> <li>• <a href="http://www.chemweb.com">http://www.chemweb.com</a></li> <li>• <a href="http://www.sciencedirect.com">http://www.sciencedirect.com</a></li> <li>• <a href="http://www.rsc.org">http://www.rsc.org</a></li> </ul>



5. Other learning material such as computer-based programs/CD, professional standards or regulations and software.

## F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (i.e. number of seats in classrooms and laboratories, extent of computer access etc.)

1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)

- **Classrooms capacity (30) students.**
- **Providing hall of teaching aids including computers and projector.**

2. Computing resources (AV, data show, Smart Board, software, etc.)

- **Room equipped with computer and projector and TV.**

3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list)

- **No other requirements.**

## G Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching  
Complete the questionnaire evaluation of the course in particular.

2 Other Strategies for Evaluation of Teaching by the Program/Department Instructor

- **Observations and the assistance of colleagues.**
- **Independent evaluation for extent to achieve students the standards.**
- **Independent advice of the duties and tasks.**

3 Processes for Improvement of Teaching

- **Workshops for teaching methods.**
- **Continuous training of member staff.**
- **Review of strategies proposed.**
- **Providing new tools for learning.**
- **The application of e-learning.**
- **Exchange of experiences internal and external.**



4. Processes for Verifying Standards of Student Achievement (e.g. check marking by an independent member teaching staff of a sample of student work, periodic exchange and remarking of tests or a sample of assignments with staff at another institution)

- **Check marking of a sample of exam papers, or student work.**
- **Exchange corrected sample of assignments or exam basis with another staff member for the same course in other faculty.**

5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.


- **Periodic Review of the contents of the syllabus and modify the negatives.**
- **Consult other staff of the course.**
- **Hosting a visiting staff to evaluate of the course.**
- **Workshops for teachers of the course.**

Faculty or Teaching Staff: Dr. Mohammed Kassem

Signature: 

Date Report Completed: 14/1/2019

Received by: Dr. Ismail Althagafi Department Head

Signature: 

Date: 20/1/2019

