

COURSE SPECIFICATIONS

Form

Course Title: Separation and Method Validation

Course Code: 4026824-3



Date: 26-10-2018

Institution: Umm Al-Qura University.

College: Faculty of Applied Science

Department: Department of Chemistry

A. Course Identification and General Information

1. Course title and code: **Separation and Method Validation / 4026824-3**

2. Credit hours: **3 hrs.(Theoretical)**

3. Program(s) in which the course is offered: **M. Sc. in Chemistry**

4. Name of faculty member responsible for the course: **Dr. Mohammed Ahmed Kassem**

5. Level/year at which this course is offered: **2nd / 1st**

6. Pre-requisites for this course (if any): **not applicable**

7. Co-requisites for this course (if any): **not applicable**

8. Location if not on main campus: **El-Abedyah, El-Azizya, and El-Zaher**

9. Mode of Instruction (mark all that apply):

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|-------------------------------------|-------------------------------------|-------------|--------------------------------------|
| a. Traditional classroom | <input type="checkbox"/> | percentage? | <input type="checkbox"/> |
| b. Blended (traditional and online) | <input checked="" type="checkbox"/> | percentage? | <input type="checkbox" value="80%"/> |
| c. E-learning | <input checked="" type="checkbox"/> | percentage? | <input type="checkbox" value="20%"/> |
| d. Correspondence | <input type="checkbox"/> | percentage? | <input type="checkbox"/> |
| f. Other | <input type="checkbox"/> | percentage? | <input type="checkbox"/> |

Comments:

B Objectives

1. The main objective of this course

By the end of this course, the students will be familiar with:

- The physical and chemical principles of separations
- The new tools in separation as isoelectric focusing; 2D gel electrophoresis and electrochromatography.
- The regulations, standards, and guidelines, risk-based validation and qualification, validation of analytical methods, data review and validation and evaluation of uncertainty.

2. Describe briefly any plans for developing and improving the course that are being implemented. (e.g. increased use of the IT or online reference material, changes in content as a result of new research in the field)

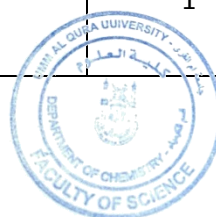
- Increased use of IT or web based reference material.
- The use of smart teaching halls for lectures.
- Encourage students to carry out research reports in the course subjects using the library, data base services, and/or websites.
- Changes in content as a result of new research in the field.

C. Course Description (Note: General description in the form used in the program's bulletin or handbook)

Course Description:

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
a- Physical and chemical principles of separations	1	3
b- Column technology for gas, liquid, and supercritical fluid chromatography: Theory, principles, and instrumentation;	2	6
c- Estimation of the quality of a separation system and Van Deemter equation.	1	3
d- Applications of ion chromatography, gel permeation, packing material, elution gradients, retention index, gas chromatography (gas-solid, gas-liquid, capillary gas).	2	6
e- Electrophoresis; Capillary electrophoresis (CE); Zone electrophoresis.	1	3



f- Isoelectric focusing; 2D gel electrophoresis; Electrochromatography; Sodium dodecyl sulphate polyacrylamide gel electrophoresis (SDS-PAGE).	1	3
g- Supercritical fluid chromatography (SCFC); Physical processes, modern instrumentation, and response characteristics of detectors relevant to these methods.	2	6
h- Regulations, standards, and guidelines, risk-based validation and qualification.	2	6
i- Validation of analytical methods, data review and validation and evaluation of uncertainty.	1	3

2. Course components (total contact and credit hours per semester):

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	39	--	--	--	--	39
	Actual	39	--	--	--	--	39
Credit	Planned	3	--	--	--	--	3
	Actual	3	--	--	--	--	3

3. Individual study/learning hours expected for students per week.

2 Hrs

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategies

On the table below are the five NQF Learning Domains, numbered in the left column.

First, insert the suitable and measurable course learning outcomes required in the appropriate learning domains (see suggestions below the table). **Second**, insert supporting teaching strategies that fit and align with the assessment methods and targeted learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy should fit in together with the rest to form an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)

Curriculum Map

Code #	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	Knowledge		
1.1	<ul style="list-style-type: none"> Understand the physical and chemical principles of separations. 	<ul style="list-style-type: none"> Lectures Scientific discussion 	<ul style="list-style-type: none"> Written mid-term and final

1.2	<ul style="list-style-type: none"> Describe the column technology for gas, liquid, and supercritical fluid chromatography. 	<ul style="list-style-type: none"> Use the library to work duties and a small research on separation and method validation. Use of the internet to carry out some reports on course subjects. 	exams. <ul style="list-style-type: none"> Long and short essays
1.3	<ul style="list-style-type: none"> Identify the quality of a separation system and Van Deemter equation. 		
1.4	<ul style="list-style-type: none"> Recording the applications of ion chromatography, gel permeation, packing material and elution gradients. 		
1.5	<ul style="list-style-type: none"> Explain the electrophoresis; Capillary electrophoresis (CE) as well as Zone electrophoresis. 		
1.6	<ul style="list-style-type: none"> Compare between isoelectric focusing and 2D gel electrophoresis. 		
1.7	<ul style="list-style-type: none"> Outline the regulations, standards, and guidelines in addition to risk-based validation and qualification. 		
1.8	<ul style="list-style-type: none"> Write about data review and validation and evaluation of uncertainty. 		
2.0	Cognitive Skills		
2.1	<ul style="list-style-type: none"> Modify the quality of a separation system. 	<ul style="list-style-type: none"> Lectures Scientific discussion Library visits Web-based study Using brain storming at the beginning of each lecture in order to stimulate the students towards the new topic of the course. Enhancing open discussion during the lecture. 	<ul style="list-style-type: none"> Mid-term and final exams. Measuring the response to the assignments. Through assignments and homework
2.2	<ul style="list-style-type: none"> Explain the application of sodium dodecyl sulphate in polyacrylamide gel electrophoresis (SDS-PAGE). 		
2.3	<ul style="list-style-type: none"> Construct the supercritical fluid chromatography (SCFC). 		
2.4	<ul style="list-style-type: none"> Report the characteristics of detectors relevant to Supercritical fluid chromatography (SCFC). 		
2.5	<ul style="list-style-type: none"> Interpret the validation of analytical methods. 		
3.0	Interpersonal Skills & Responsibility		
3.1	<ul style="list-style-type: none"> Operate in team work and accept his college's opinions. 	<ul style="list-style-type: none"> Dividing students into groups to carry 	<ul style="list-style-type: none"> Evaluate the results of

3.2	<ul style="list-style-type: none"> Choose the suitable method to solve problems. 	<ul style="list-style-type: none"> out collective scientific reports. 	<ul style="list-style-type: none"> collective works and duties as well as knowing the contribution of each individual through dialogue and discussion.
3.3	<ul style="list-style-type: none"> Develop the student's ability in self-reliance and responsibility. 	<ul style="list-style-type: none"> Periodic individual duties to develop the skill of taking responsibility and self-reliance. 	<ul style="list-style-type: none"> Assessment of individual tasks and duties to determine the student's ability to self-reliance.
4.0	Communication, Information Technology, Numerical		
4.1	Use computers and the international information network (the Internet) to perform calculations and to identify recent research relevant to decision sources.	<ul style="list-style-type: none"> Visiting research centers. The use of computers in the training room of the department. Using the internet for collecting data. 	<ul style="list-style-type: none"> Evaluation of the duties associated with the proper use of numerical and communication skills. Web-based student performance systems. Individual and group presentations.
4.2	Communicate effectively in oral and written forms.		
4.3	Use basic mathematical and statistical techniques to perform data analysis.		
5.0	Psychomotor(if any)		
5.1	Not applicable.		

5. Assessment Task Schedule for Students During the Semester

	Assessment task (i.e., essay, test, quizzes, group project, examination, speech, oral presentation, etc.)	Week Due	Proportion of Total Assessment
1	Activities and Assignments.	--	10 %
2	Midterm Exam.	8	30 %
3	Final Exam.	15-16	60 %

4	Total	100 %
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D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic counseling. (include the time teaching staff are expected to be available per week)
 - Office hours: During the working hours weekly.
 - Academic advising for students.
 - Availability of Staff members to provide counseling and advice.

E Learning Resources

1. List Required Textbooks
 - 1- *Validation and Qualification in Analytical Laboratories*, Ludwig Huber, 2ed edition, New York, NY 10017, 2007 by Informa Healthcare USA, Inc.
 - 2- *Bioanalysis of Pharmaceuticals, Sample Preparation, Separation Techniques, and Mass Spectrometry*, STEEN HONORÉ HANSEN, 2015 John Wiley & Sons, Ltd.
 - 3- *Green Chromatographic Techniques Separation and Purification of Organic and Inorganic Analytes*, Inamuddin, Ali Mohammad, 2014, Springer Dordrecht Heidelberg London New York
2. List Essential References Materials (Journals, Reports, etc.)
 - 1- Faure K, Bouju E, Suchet P, Berthod A (2013) Use of limonene in CCC: a green alkane substitute. *Anal Chem* 85:4644-4650. doi:10.1021/ac4002854
 - 2- Lee J, Gupta S, Huang J, Jayathilaka LP, Lee B (2013) HPLC-MTT assay: anti-cancer activity of aqueous garlic extract is from allicin. *Anal Biochem* 436:187–189
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.
 - 1- *Analytical Method Validation and Instrument Performance Verification*, Chung Chow Chan, 2004, John Wiley & Sons, Inc., Hoboken, New Jersey.
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software.
 - <http://nsdl.niscair.res.in/jspui/>
 - <http://www.chemistry.uoc.gr/>
 - <http://www.chemie.uni-hamburg.de/>

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.)
 - Equipped lecture hall specializing in separation and method validation.
 2. **Technology** resources (AV, data show, Smart Board, software, etc.)
 - Room equipped with computers, data show 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 Procedures

1. Strategies for Obtaining Student's Feedback on Effectiveness of Teaching

<ul style="list-style-type: none">• Student representation on staff-student committees and institutional bodies.• Structured group discussions and/or focus groups.• Questionnaires can be used to collect student feedback.
<p>2. Other Strategies for Evaluation of Teaching by the Instructor or the Department</p> <ul style="list-style-type: none">• Colleagues have the expertise to evaluate the quality of a course as evidenced by its content and format (peer reviewers).• The instructor's statement of his/her goals for the course, teaching methods and philosophy, student outcomes, and plans for improvement are a critical source of information.• A systematic self-review has the potential for contributing significantly to the instructor's teaching improvement by focusing on the strengths and weaknesses of the course in light of his/her original course objectives.• Visits by other faculty can provide information about the process of teaching.
<p>3. Procedures for Teaching Development</p> <ul style="list-style-type: none">• Exchange of experiences internal and external.• Training programs and workshops for Staff member.• The application of e-learning.
<p>4. Procedures for Verifying Standards of Student's Achievement (e.g. check marking by an independent member teaching staff of a sample of student's work, periodic exchange and remarking of tests or a sample of assignments with staff members at another institution)</p> <ul style="list-style-type: none">• Periodic exchange and remarking of tests or a sample of assignments with staff at another institution.• Check marking by an independent member teaching staff of a sample of student work.
<p>5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it.</p> <ul style="list-style-type: none">• Hosting a visiting staff to evaluate of the course.• Periodic review of the contents of the syllabus and modify the negatives.• Consult other staff of the course.

Name of Course Instructor: Dr. Mohammed Ahmed Kassem

Signature:  **Date Completed: 26 – 10 - 2018**

Program Coordinator: Dr. Ismail Ibrahim Althagafi

Signature:  **Date Received: 27/10/2018**

