Kingdom of Saudi Arabia
National Commission for
Academic Accreditation & Assessment

المملكــة العربيــة السعوديــة
الهيئـــة الوطنيـــة للتقويــم
والاعـــتمـــاد الأكــاديـمــي

ATTACHMENT 5.

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

T6. Course Specifications
(CS)

Statistical Analytical Chemistry

(402611-3)

Kingdom of Saudi Arabia
National Commission for
Academic Accreditation & Assessment

المملكــة العربيــة السعوديــة
الهيئــة الوطنيــة للتقويــم
والاعـتـمــاد الأكـاديـمــي

Course Specifications

Institution: **Umm Al-qura University**	Date: **2017**
College/Department: **Faculty of Applied Science / Department of Chemistry**	

A. Course Identification and General Information

1. Course title and code: **Statistical Analytical Chemistry / 402611–3**

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. Amr Lotfy Saber**

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

a. traditional classroom   ☐   What percentage? ☐

b. blended (traditional and online)   ■   What percentage?   100%

c. e-learning   ☐   What percentage? ☐

d. correspondence   ☐   What percentage? ☐

f. other   ☐   What percentage? ☐

Comments:

Kingdom of Saudi Arabia
National Commission for
Academic Accreditation & Assessment

المملكـة العربيــة السعوديــة
الهيئــة الوطنيــة للتقويـم
والاعـتـمـاد الأكـاديـمـــي

B Objectives

1. What is the main purpose for this course?
By completing this course, the students will be familiar with:
• The statistical treatment and analysis of data.
• Theuncertainties; calibrations; detection limits; interferences; quality control and assurance and validation of analytical methods
• How to classify sampling and physical state, sampling of liquids, gas and solids.
• Using probability distributions and confidence intervals for populations, probability distributions and confidence intervals for samples,
• Comparing between accuracy and precision: determinate errors, indeterminate errors, significant figures, standard deviation, propagation of errors, the confidence limit, tests of significance, rejection of a result, linear least squares, correlation coefficient and coefficient of determination, detection limits.

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)
• 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 statistical analytical chemistry related subjects using the library, data base services, and/or websites.

C. Course Description (Note: General description in the form used in Bulletin or handbook)

Course Description:

1. Topics to be Covered		
List of Topics	No. of Weeks	Contact hours

Kingdom of Saudi Arabia
National Commission for
Academic Accreditation & Assessment

المملكــة العربيــة السعوديــة
الهيئــــة الوطنيــــة للتقويــم
والاعــتــمــاد الأكــاديــمــــي

The language of analytical chemistry: analysis, determination, and measurement, techniques, methods, procedures, and protocols, classifying analytical techniques, selecting an analytical method.	2	6
Statistical treatment and analysis of data: accuracy, precision, sensitivity, detection limit, limit of quantitation, linearity, range, selectivity, selectivity coefficient, robustness and ruggedness.	2	6
Developing the procedure: calibration and standardization, populations and samples (probability distributions for populations, confidence intervals for populations, probability distributions for samples.	1	3
Confidence intervals for samples, sampling procedure, sampling and physical state, sampling of liquids, gas and solids, preparation of laboratory sample, moisture in samples and validation of analytical methods.	2	6
Significance testing, significant figures, errors in significance testing, propagation of uncertainty and characterizing experimental errors	1	3
Errors in chemical analysis, mean, median, classification of errors, determinate errors, indeterminate errors, absolute error, relative error, gross errors and Bias	1	3
Types of systematic errors (instrumental errors, chemical or method errors and personal errors).Difference between constant error and proportional error	1	3
The standard deviation, average deviation, propagation of errors, relative average deviation, rejection of a result, linear least squares, correlation coefficient and coefficient of determination.	1	3
The principal components of aquality assurance program: quality control and quality assessment.	1	3
Revision	1	3

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

	Lecture	Tutorial	Laboratory or Studio	Practical	Other:	Total

Kingdom of Saudi Arabia
National Commission for
Academic Accreditation & Assessment

المملكــة العربيــة السعوديــة
الهيئـــة الوطنيـــة للتقويــم
والاعــتـمــاد الأكــاديـمــــي

Contact Hours	39	-		-		39
Credit	3	-		-		3

3. Additional private study/learning hours expected for students per week.	3 hrs

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

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 intended learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy ought to reasonably fit and flow together as an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)

Code #	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	**Knowledge**		
1.1	Recognize statistical treatment and analysis of data.	• Lectures • Scientific discussion • Library visits • Web-based study • Using open discussion to link the previous knowledge	• Exams • web-based student performance systems • portfolios • long and short
1.2	Identify parameters such as analysis, determination, measurement, techniques, methods, procedures, and protocols.		
1.3	Define the classification of analytical techniques and selecting an analytical method		
1.4	Familiar with uncertainties; calibrations;		

Kingdom of Saudi Arabia
National Commission for
Academic Accreditation & Assessment

المملكــة العربيــة السعوديــة
الهيئـــة الوطنيـــة للتقويــم
والاعـــتــمـــاد الأكـــاديـمـــي

	detection limits; interferences; quality control and assurance and validation of analytical methods	to the current and future topics	essays
1.5	Know the classification of sampling and physical state, sampling of liquids, gas and solids	• The students use the internet to prepare an essay about a recent advances related to the course	
1.6	Recognize the deference between accuracy and precision: determinate errors, indeterminate errors, significant figures, standard deviation		
1.7	Outline the propagation of errors, the confidence limit, tests of significance, rejection of a result, linear least squares, correlation coefficient and coefficient of determination, detection limits and quality control		
2.0	**Cognitive Skills**		
2.1	Design the schematic diagram of the analytical approach to problem solving, showing the role of the quality assurance program	• 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.	• Exams • web-based student performance systems • portfolios • long and short essays • Through assignments and homework.
2.2	Apply the suitable methods to analysis the data		
2.3	Formulate the different types of errors		
2.4	Confirm the accuracy and precision: determinate errors, indeterminate errors, significant figures, standard deviation		
2.5	Apply the quality control and quality		

Kingdom of Saudi Arabia
National Commission for
Academic Accreditation & Assessment

المملكــة العربيــة السعوديــة
الهيئــة الوطنيــة للتقويــم
والاعـتـمــاد الأكــاديـمــي

	assurance	• Enhancing open discussion during the lecture.	
3.0	**Interpersonal Skills & Responsibility**		
3.1	Take the personality and responsibility for their own learning.	• Encourage the solving problems in groups during lecture.	• Homework and group reports
3.2	Work effectively in groups and exercise leadership when appropriate.		
3.3	Act ethically and consistently with high molar standards in personal and public forums.	• Making open discussion about certain recent topic of the course.	
3.4	Community linked thinking		
4.0	**Communication, Information Technology, Numerical**		
4.1	Communicate effectively in oral and written forms.	• Lectures • Scientific discussion • Library visits • Web-based study	• Exams • web-based student performance systems • portfolios • long and short essays
4.2	Use information and communication technologies		
4.3	Use basic mathematical and statistical techniques.		
5.0	**Psychomotor**		
5.1	NOT APPLICABLE		
5.2			

5. Schedule of Assessment Tasks for Students During the Semester		
Assessment task (e.g. essay, test, group project,	Week	Proportion of

Kingdom of Saudi Arabia
National Commission for
Academic Accreditation & Assessment

المملكــة العربيــة السعوديــة
الهيئــة الوطنيــة للتقويــم
والاعـتـمــاد الأكــاديـمــي

	examination, speech, oral presentation, etc.)	Due	TotalAssessment
1	Activities and Assignments.	--	10 %
2	Midterm Exam.	8	30 %
3	Final Exam.	15-16	60 %
4	**Total**	**100 %**	

D. Student Academic Counseling and Support

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)

- We have faculty members to provide counselling and advice.
- Office hours: During the working hours weekly.
- Academic Advising for students.

E Learning Resources

1. List Required Textbooks

David Harvey "*Modern Analytical Chemistry*" Copyright © 2000. Exclusive rights by The McGraw-Hill Companies, Inc. for manufacture and export INTERNATIONAL EDITION ISBN 0–07–116953–9.

2. List Essential References Materials (Journals, Reports, etc.)

• Lecture Handouts available on the coordinator website.

3. List Recommended Textbooks and Reference Material (Journals, Reports, etc)

•Gary D. Christian, Purnendu K. Dasgupta and Kevin A. Schug, Analytical Chemistry, 7th edition, WILEY (2014).

4. List Electronic Materials, Web Sites, Facebook, Twitter, etc.

- **http://www.chemweb.com**
- **http://www.sciencedirect.com**

Kingdom of Saudi Arabia
National Commission for
Academic Accreditation & Assessment

المملكــة العربيــة السعوديــة
الهيئــــة الوطنيــــة للتقويــم
والاعــتـمــاد الأكـاديـمــــي

• **http://www.rsc.org**
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.) • Equippedclassrooms. • 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 Instructor or by the Department • Observations and the assistance of colleagues. • Independent evaluation forextent toachieve students the standards. • Independent adviceofthe dutiesandtasks.
3 Processes for Improvement of Teaching • Workshops for teaching methods. • Continuous training of member staff. • Review of strategies proposed.

Kingdom of Saudi Arabia
National Commission for
Academic Accreditation & Assessment

المملكــة العربيــة السعوديــة
الهيئــة الوطنيــة للتقويــم
والاعــتـمــاد الأكــاديـمــي

- 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.

Name of Instructor: **Dr. Amr Lotfy Saber**

Signature:_____Date Report Completed:_20/1/2017_

Name of Field Experience Teaching Staff _Analytical Chemistry

Program Coordinator:_____

Signature: _____   Date Received:_____