

Kingdom of Saudi Arabia
**The National Commission for Academic Accreditation &
Assessment**

**Course Specifications
(CS)**

Course Specifications

Institution	King Saud University	Date
College/Department :College of science chemistry department		

A. Course Identification and General Information

1. Course title and code: Fundamentals of analytical chemistry			
2. Credit hours 3 (2+0+1)			
3. Program(s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs) B.Sc. Chemistry			
4. Name of faculty member responsible for the course Dr. Khalid Alotaibi			
5. Level/year at which this course is offered 3 rd level / 2 nd Year			
6. Pre-requisites for this course (if any) 101 chem			
7. Co-requisites for this course (if any) Non			
8. Location if not on main campus Chemistry Department			
9. Mode of Instruction (mark all that apply)			
a. traditional classroom	<input checked="" type="checkbox"/>	What percentage?	<input type="text" value="70%"/>
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 checked="" type="checkbox"/>	What percentage?	<input type="text" value="30%"/>
Comments:			

B Objectives

1. What is the main purpose for this course?

The student should understand:

1- Chemical Equilibrium

2- Application of Chemical Equilibrium to acid-base , precipitation , Chelating and oxidation reduction reactions

3- Preparation of solutions.

4- How to drive titration curves.

5- How to choose the suitable indicator for the titration.

6- Identify appropriate methods for certain chemical analysis.

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)

1- New text books.

2- Recent research publications.

3- Related Web Sites.

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

Course Description:

1. Topics to be Covered

List of Topics	Contact hours	No. of Weeks

General Introduction to Analytical Chemistry : Including Definition of analytical chemistry – Qualitative and Quantitative Analysis – General Steps of Analysis – Chemical and Instrumental Analysis .	2	3
Preparation of Solutions : Molarity and Normality – ppm and ppb - %w/w %w/v %v/v - Molarity and Active concentration .	2	
Acid – Base Titrations : Calculation of pH of acids and bases solutions and their solutions and buffers – the effect of pH on the composition of Poly-acid solution – Titration Curves – Titration of mixtures of acids and mixtures of bases – Indicators how they work and the selection of a suitable indicator for a certain titration – precession of acid – base titration – applications .	8	3
Precipitation Titration : Ksp and Solubility Calculations – Derivation of titration curves – Titrations using silver nitrate (Argentometric Titrations) i.e Volhard . Mohar and adsorption indicator methods	3	2
Complex-formation Titration : Complex-formation reactions – Types of Ligands – Uses of complexes in analytical chemistry – Selection of suitable ligand for a titration – indicators – EDTA titrations (effect of pH , effect of other complexing agents on EDTA titration curves , titration curves) – Types of EDTA titrations – the selectivity of EDTA titration – Water hardness	5	3
Oxidation-Reduction Reaction Titrations :Electrochemical cells – electrode potential –standard potential – factors affecting electrode potential –writing balanced equation – equilibrium constant – reaction rates – titration curves –types of indicators – selection of a suitable indicator –pretreatment of sample solution (auxiliary redox agents) – Applications of common reagents i.e KMnO4 , Ce(IV) , KCr2O7 , I2	8	3

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

	Lecture	Tutorial	Laboratory or Studio	Practical	Other:	Total
Contact Hours	30		30			60
Credit	2		1			3

3. Additional private study/learning hours expected for students per week. 4 hours per week for homework and lab. reports .	<input type="text"/>
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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.)

	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	Knowledge		
1.1	Describe the classification of various chemical analyses with its suitable techniques and their relevant applications.	- Lecture - Discussion	- Quizzes - Short seminar
1.2	recognize all units of concentrations of analytes in various sample matrices.	- Homework - Training and	- Direct questions - Homework assignments
1.3	Define the basic fundamentals of qualitative analysis	demonstration	- Midterm exam
1.4	recognize all rules of concentrations.	- Laboratory experiments - Real examples	- Final exam
2.0	Cognitive Skills		
2.1	Explain the basic theories of chemical analysis methods.	- Discussion - Homework - Solving problems	-Quizzes. -Theoretical Exams. -Oral Discussion.
2.2	Differentiate between different forms of solutions, their preparations and concentrations.	- Laboratory	-practical exams.

2.3	Calculate the solubility product and equilibrium constant	experiments - Connect of the knowledge with the real examples	-Course work report. - Midterm exam - Laboratory reports - Final exam
2.4	Interpret data obtained from results of chemical analysis		
2.5	Explain the problems concerns in the course.		
3.0	Interpersonal Skills & Responsibility		
3.1	Demonstrate continuing personal and professional development.	- Solving problems with group - Discussion - Writing laboratory reports	- Evaluating individual works - Homework assignments - Evaluating laboratory reports
3.2	Demonstrate the team work and interaction with others		
3.3	Use learning resources such as lecture textbooks, websites and scientific literatures.		
3.4	Write assignments in due time.		
4.0	Communication, Information Technology, Numerical		
4.1	Operate communication technology, computer programs and e-learning using blackboard.	-Putting resources (courses and homework)on the blackboard. -encourage students to ask questions through this system. -The use of various technologies in the information display. - Encouraging self-learning and self-assessment. -Encourage students to do research and investigate using the internet and contact digital libraries	- Observation - Demonstration - Short seminar and discussion - Short problems - Evaluating laboratory reports s
4.2	Research in the internet as means of communication and a source of information.		
4.3	Use of computer programs such as Microsoft Excel or other mathematical tool to deal with the chromatographic parameters and evaluations		
5.0	Psychomotor		
5.1	Demonstrate good and safe handling of laboratory chemicals, glassware and equipment during experiments	Perform laboratory experiments individually and in groups	Laboratory reports and practical exams

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)

Office hours (12 per week for all students)
Help session in lab.

E Learning Resources

1. List Required Textbooks

Analysis , I.Z.AL-ZAMIL , M.A. ALHAJJAJI , S.A.AL-TAMRAH AND M.BANAH ,
ALKHURAIJY PUBLISHER , RIYADH , 1428

2. List Essential References Materials (Journals, Reports, etc.)
Analytical Chemistry, 5th ed. By G. D. Christian, Wiley, 2004.

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

- a- PRINCIPALS OF ANALYTICAL CHEMISTRY , SKOOG AND WEST
- b- Chemical equilibrium and analysis , RICHARD W. RAMETTE , ADDISON-WESLEY PUBLISHER. LONDON.

4. List Electronic Materials (eg. Web Sites, Social Media, Blackboard, etc.)

Science Direct (Web Site.)

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

Handouts & Power point presentation

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.) - Classroom with 25 seats. - A chemical lab. for 25 students.
2. Computing resources (AV, data show, Smart Board, software, etc.) - Computer Lab containing 15 computer set.
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list) Instruments, chemicals, reagents, analytical balances and first aid and safety equipments.

G Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching * Course evaluation by students. * Course evaluation by postgraduate students.
2 Other Strategies for Evaluation of Teaching by the Program/Department Instructor • Peer consultation on teaching. • Departmental council meetings. • Discussion with analytical group.
3 Processes for Improvement of Teaching • Conducting workshops presented by experts on the teaching methodologies. • Departmental versions on its methods at teaching.

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)

- Grading questions by some members of the analytical group, who teach the same course.
- Faculty member from other universities to review and evaluate the accuracy of grading policy.

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

- The chairman of the department and faculty council take the responsibility.
- The course material should be reviewed by departmental, faculty and higher council.

Name of Instructor: Dr. Khalid Alotaibi

Signature: _____ Date Report Completed: 02/06/2017

Name of Field Experience Teaching Staff _____

Program Coordinator: _____

Signature: _____ Date Received: _____