



ATTACHMENT 2 (e)

Course Specifications

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

652 Chem.

**Course Specifications
(CS)**



Course Specifications

Institution	<i>King Saud University</i>	Date of Report	Dec. 2020
College/Department	<i>Science / Chemistry</i>		

A. Course Identification and General Information

1. Course title and code: <i>(652 Chem) Applied Analytical Chemistry (computation by computers)</i>			
2. Credit hours 3 (3+0)			
3. Program(s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs)			
4. Name of faculty member responsible for the course <i>Prof. Hassan Mohammed Al Swaidan</i>			
5. Level/year at which this course is offered <i>1st level in Doctorate Studies</i>			
6. Pre-requisites for this course (if any)			
7. Co-requisites for this course (if any)			
8. Location if not on main campus <i>Chemistry Department, College of Science, KSU</i>			
9. Mode of Instruction (mark all that apply)			
a. Traditional classroom	<input type="text"/>	What percentage? 50%	<input type="text"/>
b. Blended (traditional and online)	<input type="text"/>	What percentage?	<input type="text"/>
c. e-learning	<input type="text"/>	What percentage? 50%	<input type="text"/>
d. Correspondence	<input type="text"/>	What percentage?	<input type="text"/>
f. Other	<input type="text"/>	What percentage?	<input type="text"/>
Comments:			



B Objectives

<p>1. What is the main purpose for this course?</p> <ul style="list-style-type: none"> • <i>Use of PowerPoint and Excel in Analytical Chemistry.</i> • <i>Acquisition of basic theoretical and computational knowledge in the field of Analytical Chemistry.</i> • <i>Solving practical problems from various fields</i>
<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>

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
<i>Use of PowerPoint, the topic covers overview, getting started, customize, presentation, working with content, formatting text, adding content, graphics, tables, charts, slide effects, printing and PowerPoint tips.</i>	<i>1</i>	<i>3</i>
<i>Use of Excel, The topic covers overview, getting started, customize, workbook, data, modifying a worksheet, calculations, macros, sort and filter, graphics, charts, format worksheet, developing a workbook, page properties and printing, layout.</i>	<i>1</i>	<i>3</i>
<i>Mathematic and excel calculations of principles of calculations in analytical chemistry. Topic includes Equivalent Weight, Number of Equivalent, Moles, Molarity, Normality, Percent Concentration, ppt, ppm, ppb for Solid Samples, ppt, ppm, ppb for Liquid Samples, Concentration in (mequiv/L), Density.</i>	<i>1</i>	<i>3</i>
<i>Mathematic and excel calculations of statistical calculations in analytical chemistry. Topic includes Accuracy, Precision, Propagation of errors, Confidense limits, Standard test for analytical methods, Linear least squares, Corelation coefficient.</i>	<i>1</i>	<i>3</i>



<i>Mathematic and excel calculations of rate and equilibrium of chemical reactions. Topic includes Reaction rate, Equilibrium constant, Common ion effect, Activity and activity coefficient, Diverse ion effect.</i>	<i>1</i>	<i>3</i>
<i>Mathematic and excel calculations of gravimetric analysis. Topic includes Solubility product, precipitation and percentage calculations.</i>	<i>1</i>	<i>3</i>
<i>Mathematic and excel calculations of acid and base equilibrium. Topic includes Strong acids and bases, pH, Weak acids and bases, Salts of weak acids and bases, Buffer solutions, Polyprotic acids and its salts, Fraction of dissociation species, Salts of polyprotic acids.</i>	<i>1</i>	<i>3</i>
<i>Mathematic and excel calculations of acid and base titrations. Topic includes Strong acids and base titrations, weak acids and strong base titrations, Strong acids and weak base titrations, Titration of acid base mixture.</i>	<i>1</i>	<i>3</i>
<i>Mathematic and excel calculations of complexometric titrations. Topic includes Complexes and formation constants, EDTA titrations.</i>	<i>1</i>	<i>3</i>
<i>Mathematic and excel calculations of oxidation reduction titrations. Topic includes Oxidation reduction process, Electrochemical cells, Nernst equation, Equilibrium constants in oxid reduction reactions, Equivalent point potential, Iodimetry and Iodometry.</i>	<i>1</i>	<i>3</i>



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

3. Additional private study/learning hours expected for students per week.	<input type="text"/>
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4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategy
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Course Learning Outcomes, Assessment Methods, and Teaching Strategy work together and are aligned. They are joined together as one, coherent, unity that collectively articulate a consistent agreement between student learning, assessment, and teaching.

The *National Qualification Framework* provides five learning domains. Course learning outcomes are required. Normally a course has should not exceed eight learning outcomes which align with one or more of the five learning domains. Some courses have one or more program learning outcomes integrated into the course learning outcomes to demonstrate program learning outcome alignment. The program learning outcome matrix map identifies which program learning outcomes are incorporated into specific courses.

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. **Fourth**, if any program learning outcomes are included in the course learning outcomes, place the @ symbol next to it.

Every course is 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	<i>- Mathematical and excel problem solving.</i>		
1.2	<i>- In class – presentation in excel and powerpoint , midterm and final exams.</i>		
1.3	<i>Theoretical lectures, solving practical problems using math and excel calculations.</i>		
2.0	Cognitive Skills		
2.1	<i>- Training students on PowerPoint and Excel in analytical calculations.</i>		
2.2	<i>- Solving model problems in Excel and PowerPoint.</i>		
2.3	<i>- Participation of all students to the course - Short exams</i>		
3.0	Interpersonal Skills & Responsibility		
3.1	<i>Ability of students to solve practical problems</i>		
3.2	<i>Power Point and Excel Presentation in class and participation of all students to solve chemistry problems.</i>		
3.3	<i>Power Point and Excel presentation, mid-term and final exams</i>		
4.0	Communication, Information Technology, Numerical		
4.1	<i>Determine the use of computers in analytical chemistry.</i>		
4.2	<i>Powerpoint and Excel assisted problem solving</i>		
4.3	<i>Weekly power point presentation of math and excel calculation for problem solving</i>		
5.0	Psychomotor		
5.1	<i>Computer knowledge, and excel manipulation for equation solvin</i>		



5.2	<i>Developing student skill for computer usage</i>		
5.3	<i>Exam using power points for chemical equation solving</i>		

Suggested Guidelines for Learning Outcome Verb, Assessment, and Teaching

NQF Learning Domains	Suggested Verbs
Knowledge	list, name, record, define, label, outline, state, describe, recall, memorize, reproduce, recognize, record, tell, write
Cognitive Skills	estimate, explain, summarize, write, compare, contrast, diagram, subdivide, differentiate, criticize, calculate, analyze, compose, develop, create, prepare, reconstruct, reorganize, summarize, explain, predict, justify, rate, evaluate, plan, design, measure, judge, justify, interpret, appraise
Interpersonal Skills & Responsibility	demonstrate, judge, choose, illustrate, modify, show, use, appraise, evaluate, justify, analyze, question, and write
Communication, Information Technology, Numerical	demonstrate, calculate, illustrate, interpret, research, question, operate, appraise, evaluate, assess, and criticize
Psychomotor	demonstrate, show, illustrate, perform, dramatize, employ, manipulate, operate, prepare, produce, draw, diagram, examine, construct, assemble, experiment, and reconstruct



Suggested **verbs not to use** when writing measurable and assessable learning outcomes are as follows:

Consider	Maximize	Continue	Review	Ensure	Enlarge	Understand
Maintain	Reflect	Examine	Strengthen	Explore	Encourage	Deepen

Some of these verbs can be used if tied to specific actions or quantification.

Suggested assessment methods and teaching strategies are:

According to research and best practices, multiple and continuous assessment methods are required to verify student learning. Current trends incorporate a wide range of rubric assessment tools; including web-based student performance systems that apply rubrics, benchmarks, KPIs, and analysis. Rubrics are especially helpful for qualitative evaluation. Differentiated assessment strategies include: exams, portfolios, long and short essays, log books, analytical reports, individual and group presentations, posters, journals, case studies, lab manuals, video analysis, group reports, lab reports, debates, speeches, learning logs, peer evaluations, self-evaluations, videos, graphs, dramatic performances, tables, demonstrations, graphic organizers, discussion forums, interviews, learning contracts, antidotal notes, artwork, KWL charts, and concept mapping.

Differentiated teaching strategies should be selected to align with the curriculum taught, the needs of students, and the intended learning outcomes. Teaching methods include: lecture, debate, small group work, whole group and small group discussion, research activities, lab demonstrations, projects, debates, role playing, case studies, guest speakers, memorization, humor, individual presentation, brainstorming, and a wide variety of hands-on student learning activities.

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	<i>First exam</i>	<i>week 5</i>	<i>30%</i>
2	<i>Second exam</i>	<i>week 10</i>	<i>30%</i>
3	<i>Final exam</i>	<i>week 15</i>	<i>40%</i>
4			
5			
6			
7			
8			



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)
- 2.

Availability during scheduled office hours (10 hours per week)

E. Learning Resources

1. List Required Textbooks

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

-Problem Solving in Analytical Chemistry by Dr. Hassan M. Al-Swaidan

Analytical Chemistry by Gary.D Christin, 5th edition.

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

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

Google , Microsoft web site

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

1- Power point program

2- Excel program

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.)



2. Computing resources (AV, data show, Smart Board, software, etc.)
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list)

G Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching
2 Other Strategies for Evaluation of Teaching by the Program/Department Instructor
3 Processes for Improvement of 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)



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

Faculty or Teaching Staff: *Prof. Hassan Mohammed Al Swaidan*

Signature: _____ Date Report Completed:

Received by: _____ Dean/Department Head

Signature: _____ Date: _____