ATTACHMENT 2 (e)

Course Specifications

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

Course Specifications
(CS)

CHEM 101

Course Specifications

Institution **King Saud University**	Date of Report
College/Department **College of Science - Chemistry department**	

A. Course Identification and General Information

1. Course title and code:
General Chemistry, CHEM 101

2. Credit hours **4 hours**

3. Program(s) in which the course is offered.
(If general elective available in many programs indicate this rather than list programs)
B.Sc. in Chemistry and other programs in scientific colleges.

4. Name of faculty member responsible for the course
Prof. Abdullah Al-Arifi

5. Level/year at which this course is offered **level 3**

6. Pre-requisites for this course (if any)
NA

7. Co-requisites for this course (if any)
NA

8. Location if not on main campus

9. Mode of Instruction (mark all that apply)

a. Traditional classroom	√	What percentage?	90%
b. Blended (traditional and online)		What percentage?	
c. e-learning	√	What percentage?	10%
d. Correspondence		What percentage?	
f. Other		What percentage?	

Comments:

B Objectives

1. What is the main purpose for this course? This course provides students with an in-depth knowledge of the principles and applications of chemistry. Topics include chemical reactions stoichiometry, thermochemistry, gas laws, properties of solvents, reaction kinetics, and chemical equilibrium. Students may apply these concepts using practical examples, facilitated discussions, and the experiments conducted through hands-on labs. After finishing the course, student will gain basic knowledge of general laboratory rules, self-protection and handling chemicals and glass wares. The students will also experience laboratory techniques and the methodology of writing reports, comments and explaining observations. The student will also learn how to be prepared for the practical session by a thorough understanding of the experiment prior to entering the lab and must be able to answer in-depth post-laboratory questions.
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) Course development through web based learning management system (Blackboard) has been implemented. Students are encouraged to use the web based learning resources and participate in the discussion boards for better understanding of course topics and exchange information with their colleagues. Online assignments are also used for improving students learning assessment. Distance learning and online communication with instructor is also available and planned to be used soon.

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
Units of Measurements and Stoichiometry (mole relations, chemical formula, limiting reactant, yield %, dilution of solutions, and solution stoichiometry)	2	6
Properties of gases (gas laws, ideal gas, molecular kinetic theory, gaseous diffusion and effusion, real gases)	2	6
Thermochemistry and first law of thermodynamics (Enthalpy of reactions, enthalpy of combustion, enthalpy of formation, internal energy)	2	6
Properties of solutions (types of solutions, Rault's law, colligative properties)	2	6

Chemical kinetics (reaction rate, factors influencing rate, reaction order, half life time)	2	6
Chemical Equilibrium (equilibrium constants, factors affecting equilibrium, Le Chatelier's principle)	2	6
Acids and Bases, Ionic equilibria, and buffer solutions (pH, strong - weak acids and bases)	2	6

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

	Lecture	Tutorial	Laboratory	Practical	Other:	Total
Contact Hours	42		14			56
Credit	3		1			4

3. Additional private study/learning hours expected for students per week. 4

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

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	Define units, recognize relationships between reactants and products in a chemical reaction and determine the quantitative data.	○ Using modern methods of teaching with smart boards. ○ Proposing stimulation questions. ○ Demonstrations using models and animations.	• Homework assignments • Using active learning techniques. • Non-graded quizzes. • Oral and written short quizzes. • Major final and two segmented midterm exams.
1.2	Outline the General Behavior of gases and recognize Gas Laws.		
1.3	Define relation between, work, enthalpy and internal energy, and recognize the different types of enthalpies.		
1.4	Outline solution properties and solvation.		
1.5	Memorize chemical kinetics, rate law and the relation between its variables.		
1.6	Describe chemical equilibrium expressions and factors affecting it.		
1.7	Recognize types of acids and bases, their ionization, pH, pOH, the common ion effect, buffer solution, and the solubility product.		
2.0	**Cognitive Skills**		
2.1	Balance chemical equation, calculate mole relations, yield %, and concentration of solutions.	○ Solving examples. ○ Group discussions. ○ Using available electronic technology in teaching.	• Following up students' participations in group discussion activities. • Oral and written short quizzes. • Major and final exams. • Homework assignments.
2.2	Explain behavior of real and ideal gases and calculate physical parameters of gases.		
2.3	Estimate and interpret changes in enthalpy and internal energy for chemical and physical changes.		
2.4	Estimate colligative properties of solutions.		
2.4	Drive rate law and calculate chemical kinetics parameters for reaction.		
2.5	Calculate pH, pOH, H^+, OH^-, K_c, K_p, K_{sp}.		
2.6	Collect, represent, and interpret experimental data.		
3.0	**Interpersonal Skills & Responsibility**		
3.1	Work independently and as a part of a team, and communicate ideas to others in lab.	○ Group discussion, group homework and case studies.	• Performance during problems solving discussions.

3.4	Use standard laboratory equipment, modern instrumentation, and classical techniques to carry out experiments with safety.	Lab experiments	Practical lab exam
4.0	**Communication, Information Technology, Numerical**		
4.1	Utilizing university electronic resources of learning.	○ Encourage students to collect information through university provided Wi-Fi.	• Performance in problem solving and case studies. • Evaluating the proficiency in communicating the results.
4.2	Use of computer programs to efficiently understand concepts and solve problems.		
4.3	Interpretation of numerical, chemical and general scientific information.		
5.0	**Psychomotor**		
5.1	Demonstrate safe handling of laboratory chemicals and glass ware during experiments.	Perform lab. Experiments individually and in groups	Lab reports, and practical exams.

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
	First midterm exam	5th week	15%
	First practical Lab exam	7th week	15%
	Second midterm exam	10th week	15%
	Second practical Lab exam	14th week	15%
	Final exam	End of semester	40%

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) 6 hours per week for direct individual consultation + online communication through LMS web (Blackboard).

E. Learning Resources

1. List Required Textbooks Chemistry, 11th edition by T. L. Brown, H.E. Le May, B.E. Bursten, and C.J. Murphy, Pearson Education International -Prentice Hall 2009
2. List Essential References Materials (Journals, Reports, etc.) NA
3. List Recommended Textbooks and Reference Material (Journals, Reports, etc) Relevant general chemistry books
4. List Electronic Materials (eg. Web Sites, Social Media, Blackboard, etc.) Recorded lectures for the whole course on LMS website (Blackboard) + electronic book website
5. Other learning material such as computer-based programs/CD, professional standards or regulations and software. NA

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.) Medium size classroom with smartboard and internet connection through the university network. Laboratories should be supplied with basic chemicals, acids, bases, indicators, glass ware, and basic equipment. Body protection safety accessories should be available to all students.

2. Computing resources (AV, data show, Smart Board, software, etc.) • Smart board and internet access in the lecture room. • E podium & data show available in all lecture rooms.
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list) NA

G Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching • Regularly-based check up with students for suggestions for course development through course evaluation.
2 Other Strategies for Evaluation of Teaching by the Program/Department Instructor • Peer consultation on teaching • Departmental council discussions • Discussions within the group of faculty teaching the course
3 Processes for Improvement of Teaching • Conducting workshops given by experts on the teaching and learning methodologies • Periodical departmental revisions of its methods of teaching. • Monitoring of teaching activates by senior faculty members 'mentor'.
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) • Providing samples of all kinds of assessment in the departmental course portfolio of each course. • Assigning group of faculty members teaching the same course to grade same questions for various students. • Faculty from other institutions are invited to review the accuracy of the grading policy. • Conducting standard exams such as the American Chemical Society exams or others.

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

- The course material and learning outcomes are periodically reviewed and the changes needed are approved during department council meetings.
- The head of department and faculty take the responsibility of implementing the proposed changes.

Faculty or Teaching Staff: Ahmad Aqel IFSEISI

Signature: ***Ahmad AQEL*** **Date Report Completed: _____**

Received by: _____ Dean/Department Head

Signature: _____ Date: _____