



**ATTACHMENT 2 (e)**

**Course Specifications**

**Kingdom of Saudi Arabia**

**The National Commission for Academic Accreditation & Assessment**

**Course Specifications  
(CS)**



## Course Specifications

<b>Institution:</b> King Saud university	<b>Date of Report:</b> 7/8/1435 H, 5/6/2014 G
<b>College/Department:</b> College of Science / Chemistry department	

### A. Course Identification and General Information

<b>1. Course title and code:</b> Chem451 Chemical Separation and Chromatographic Methods			
<b>2. Credit hours:</b> 3 Credit hours (1 lecture, 1 tutorial and 1 laboratory)			
<b>3. Program(s) in which the course is offered:</b> (If general elective available in many programs indicate this rather than list programs) Chemistry			
<b>4. Name of faculty member responsible for the course:</b> Prof. Ahmed-Yacine Badjah-Hadj-Ahmed Dr. Ahmad Agel Ifseisi			
<b>5. Level/year at which this course is offered:</b> 7 <sup>th</sup> or 8 <sup>th</sup> levels / 4 <sup>th</sup> year			
<b>6. Pre-requisites for this course (if any):</b> Chem351 Spectroscopic Analysis Methods & Chem352 Electroanalytical Methods			
<b>7. Co-requisites for this course (if any):</b> No requests			
<b>8. Location if not on main campus:</b> Main campus			
<b>9. Mode of Instruction (mark all that apply):</b>			
a. Traditional classroom	<input type="checkbox"/>	What percentage?	<input type="checkbox"/>
b. Blended (traditional and online)	<input checked="" type="checkbox"/>	What percentage?	90%
c. E-learning	<input checked="" type="checkbox"/>	What percentage?	10%
d. Correspondence	<input type="checkbox"/>	What percentage?	<input type="checkbox"/>
f. Other	<input type="checkbox"/>	What percentage?	<input type="checkbox"/>
Comments:			



## B. Objectives

### 1. What is the main purpose for this course?

The main purpose of this course is to help the students to learn and understand several concepts in extraction and separation science. By the end of this course, students expected to:

- Understand the principles of separation methods
- Be familiar with the separation methods concepts
- Know the proper separation tool for specific compounds
- Learn how to treat with experimental data
- Recognize the specific factors influencing the separation techniques
- To familiarize students with the different chromatographic techniques used in separation of chemical mixtures
- To develop the awareness in the students about the solvent extraction methods

### 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)

This course also designed to give students the opportunity to evaluate and develop the contents of this course by using of new technology in teaching, such as E-learning and using of the internet for collection of the information

## 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
Introduction for separation methods	1	2
Traditional separation methods	1	2
Extraction methods	2	4
Introduction for chromatography methods	1	2
Main fundamentals in chromatography methods	1	2
Classification of chromatographic methods	2	4



Chromatographic properties and evaluation	1	2
Applications of chromatography	2	4
Gas chromatography	2	4
High performance liquid chromatography	2	4

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

	Lecture	Tutorial	Laboratory	Practical	Other	Total
Contact Hours	15	15	24	---	---	54
Credit	1	1	1	---	---	3

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

**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
<b>1.0</b>	<b>Knowledge</b>		
1.1	Understand principles of separation methods	<ul style="list-style-type: none"> <li>- Lecture</li> <li>- Discussion</li> <li>- Homework</li> <li>- Training</li> <li>- Real examples</li> </ul>	<ul style="list-style-type: none"> <li>- Short quizzes</li> <li>- Short seminar</li> <li>- Direct questions</li> <li>- Midterm exam</li> <li>- Final exam</li> </ul>
1.2	Differentiate between the different traditional and instrumental separation techniques		
1.3	Know the most important extraction methods and their principles		
1.4	Gain knowledge of the fundamental aspects of the chromatographic techniques		
1.5	Learn the most useful separation techniques such as GC and HPLC		
1.6	Interpret and evaluate chromatograms resulted from the separation technique		
1.7	Learn about the most important application areas for GC and HPLC		
1.8	Choose the most suitable separation method for specific compounds		
<b>2.0</b>	<b>Cognitive Skills</b>		
2.1	Developing of the computer skills	<ul style="list-style-type: none"> <li>- Discussion</li> <li>- Homework assignments</li> <li>- Solving problems</li> <li>- Laboratory experiments</li> <li>- Connect of the knowledge with the real examples</li> </ul>	<ul style="list-style-type: none"> <li>- Short quizzes</li> <li>- Direct questions</li> <li>- Two Midterm exams</li> <li>- Laboratory reports</li> </ul>
2.2	Using the internet		
2.3	Using the scientific sites to find the required information		
3.3	Improving of the calculation skills		
3.4	Ability to learn the proper separation tool for specific compounds		
<b>3.0</b>	<b>Interpersonal Skills &amp; Responsibility</b>		
3.1	Ability to work in group	<ul style="list-style-type: none"> <li>- Solving problems with group</li> <li>- Discussion</li> <li>- Writing laboratory reports</li> </ul>	<ul style="list-style-type: none"> <li>- Evaluating individual works</li> <li>- Homework assignments</li> <li>- Evaluating laboratory reports</li> </ul>
3.2	Ability to work independently		
3.3	Inspire a good competitive between the students		
3.4	Ability to discuss and solve the problems with group		
3.5	Discover the leadership skills		
3.6	Determine the students creativity		
<b>4.0</b>	<b>Communication, Information Technology, Numerical</b>		
4.1	Using the computer and internet to search about the required information	<ul style="list-style-type: none"> <li>- Provide these programs for students</li> <li>- Training the students</li> <li>- Using these programs in chemistry courses</li> </ul>	<ul style="list-style-type: none"> <li>- Observation</li> <li>- Demonstration</li> <li>- Discussion</li> <li>- Short problems</li> </ul>
4.2	Ability to use different Microsoft Excel or other mathematical tool to deal with the chromatographic parameters and evaluations		
<b>5.0</b>	<b>Psychomotor</b>		
5.1	Demonstrate good and safe handling of laboratory chemicals and glassware during experiments	Perform laboratory experiments individually and in groups	Laboratory reports and practical exams

### Suggested Guidelines for Learning Outcome Verb, Assessment, and Teaching

NQF Learning Domains	Suggested Verbs
<b>Knowledge</b>	list, name, record, define, label, outline, state, describe, recall, memorize, reproduce, recognize, record, tell, and write
<b>Cognitive Skills</b>	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, and appraise
<b>Interpersonal Skills &amp; Responsibility</b>	demonstrate, judge, choose, illustrate, modify, show, use, appraise, evaluate, justify, analyze, question, and write
<b>Communication, Information Technology, Numerical</b>	demonstrate, calculate, illustrate, interpret, research, question, operate, appraise, evaluate, assess, and criticize
<b>Psychomotor</b>	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.



<b>5. Schedule of Assessment Tasks for Students During the Semester</b>			
	Assessment task (e.g. essay, test, group project, examination, speech, oral presentation, etc.)	Week Due	Proportion of Total Assessment
1	Midterm exam	6-8	20%
2	Assignment, discussion and homework's	---	10%
3	Laboratory reports, quizzes and practical exams	---	30%
4	Final exam	16-17	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)**

Office hours: 6 h/week

Laboratory assistance

#### **E. Learning Resources**

##### **1. List Required Textbooks**

Ibrahim Al-Zamil, "Analytical Chemistry, Instrumental Analysis", 2nd Ed., Al-Khrigi Library, 1998

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

Non.

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

- Gary D. Christian, Analytical Chemistry, 6<sup>th</sup> Ed., John Wiley, 2004
- Douglas Skoog, James Leary, "Principles of Instrumental Analysis", 4<sup>th</sup> Ed., Saunders College Publishing, 1992
- K. Robards, P.R. Hadad, P.E. Jackson, "Principles and Practice of Modern Chromatographic Methods", Elsevier Academic Press, 2004
- Encyclopedia of chemistry

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

Electronic book is available for students

All lectures are available on the web site (<https://fac.ksu.edu.sa/aifseisi>)

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

- Microsoft Excel

#### **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.)**

- Lecture hall for 30 students equipped with modern teaching technology (projector, smart board, computer and internet)
- Laboratory in accordance with the rules of safety and equipped with the required instruments and chemicals

##### **2. Computing resources (AV, data show, Smart Board, software, etc.)**

The presence of computer in classrooms

##### **3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list)**

- The presence of chemicals and standards used in analytical
- The presence of related analytical equipments

### G. Course Evaluation and Improvement Processes

#### 1. Strategies for Obtaining Student Feedback on Effectiveness of Teaching

- Course evaluation by students
- Student faculty meeting
- Student questionnaires
- E-suggestion

#### 2. Other Strategies for Evaluation of Teaching by the Program/Department Instructor

- Revision by the department committee
- Discussion within the group of faculty teaching the course
- Survey of the graduated students
- External evaluation

#### 3. Processes for Improvement of Teaching

- Conducting workshops given by experts on the teaching and learning methodologies
- Periodical departmental revisions
- Monitoring of teaching activities by senior faculty members
- Training of the faculties
- Increase the using modern technology methods in 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)

Checking a sample of the student's work, exams and assignments by other staff member in the department

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

Collecting all reports and evaluations at the end of the year for a reviewing purpose  
Invite external expert to evaluate the course  
Workshops for the teachers  
Consult teachers with long experience

**Faculty or Teaching Staff: Ahmad Aqel Ifseisi**

**Signature: Ahmad AQEL**

**Date Report Completed: \_\_\_\_\_**

**Received by: \_\_\_\_\_**

**Dean/Department Head: \_\_\_\_\_**

**Signature: \_\_\_\_\_**

**Date: \_\_\_\_\_**