



**ATTACHMENT 5.**

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

**T6. Course Specifications**  
**(CS)**

**Advanced Chemical Kinetics**

**(402643-3)**





### Course Specifications

Institution: <b>Umm Al-qura University</b>	Date: <b>2017</b>
College/Department: <b>Faculty of Applied Sciences / Department of Chemistry</b>	

#### A. Course Identification and General Information

1. Course title and code: <b>Advanced Chemical Kinetics / 402643-3</b>			
2. Credit hours: <b>3 hrs (theoretical)</b>			
3. Program(s) in which the course is offered. <b>M. Sc. in Chemistry</b> (If general elective available in many programs indicate this rather than list programs)			
4. Name of faculty member responsible for the course: <b>Dr. Ahmed Fawzy</b>			
5. Level/year at which this course is offered: <b>3<sup>rd</sup> / 2<sup>nd</sup></b>			
6. Pre-requisites for this course (if any): <b>not applicable</b>			
7. Co-requisites for this course (if any): <b>not applicable</b>			
8. Location if not on main campus: <b>El-Abedyah, El-Azizya, and El-Zaher</b>			
9. Mode of Instruction (mark all that apply)			
a. Traditional classroom	<input type="checkbox"/>	What percentage?	<input type="checkbox"/>
b. <b>Blended (traditional and online)</b>	<input checked="" type="checkbox"/>	What percentage?	<input type="checkbox" value="100%"/>
c. e-learning	<input type="checkbox"/>	What percentage?	<input type="checkbox"/>
d. Correspondence	<input type="checkbox"/>	What percentage?	<input type="checkbox"/>
f. Other	<input type="checkbox"/>	What percentage?	<input type="checkbox"/>
Comments:			



## B Objectives

1. Summary of the main learning outcomes for students enrolled in the course.

By the end of this course the students will be able to:

1. Describe the kinetics of complex reactions in the gas phase.
2. Develop the kinetics of photochemical reactions, explosions: autocatalysis and autocatalytic explosions
3. Write the kinetics of reactions in solution: factors affecting the rates of reactions in solution.
4. State the theories of reaction rates (collision theory, transition state theory).
5. Describe the homogeneous and heterogeneous reactions, elementary reactions, ionic reactions.
6. State the steady-state approximations.

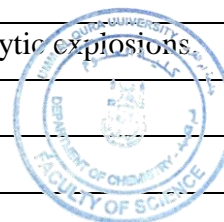
2. Briefly describe any plans for developing and improving the course that are being implemented.

(e.g. increased use of IT or web based reference material, changes in content as a result of new research in the field):

- Encourage students to make reports in the field of advanced kinetic chemistry from the library or using internet.
- Use the websites to follow up and update the new topics of the subject of the course.

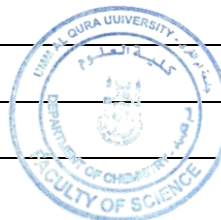
## C. Course Description (Note: General description in the form to be used for the Bulletin or handbook should be attached)

1. Topics to be Covered		
List of Topics	No. of Weeks	Contact Hours
Classification complex reactions in the gas phase.	1	3
Kinetics of complex reactions in the gas phase.	1	3
Kinetics of photochemical reactions, explosions and autocatalytic explosions.	2	6
Factors affecting the rates of reactions in solution.	1	3
Kinetics of reactions in solutions.	1	3





General revision and First Periodical Exam.	1	3
Theories of reaction rates (collision theory, transition state theory).	1	3
Homogeneous and heterogeneous reactions, elementary reactions, ionic reactions.	2	6
Steady-state approximations.	2	6
General revision and Second Periodical Exam.	1	6



2. Course components (total contact hours and credits per semester):						
	Lecture	Tutorial	Laboratory	Practical	Other:	Total
Contact Hours	13	-	-	-	-	39
Credit	3	-	-	-	-	3

3. Additional private study/learning hours expected for students per week.	2
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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.			
Code #	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	<b>Knowledge</b>		
1.1	Define the various types of complex reactions in the gas phase.	<ul style="list-style-type: none"> <li>Lectures.</li> <li>Using open discussion to link</li> </ul>	<ul style="list-style-type: none"> <li>Written exams.</li> <li>Web-based student</li> </ul>
1.2	Understand the kinetics of complex reactions.		



1.3	Explain the kinetics of photochemical reactions and explosions.	<p>the previous knowledge to the current and future topics.</p> <ul style="list-style-type: none"> <li>• The students use the internet to prepare an essay in recent advances related to the course.</li> </ul>	<p>performance systems.</p> <ul style="list-style-type: none"> <li>• Portfolios.</li> <li>• Long and short essays posters lab manuals.</li> </ul>
1.4	Describe the factors affecting the reactions in solutions and their kinetics.		
1.5	Describe steady-state approximations.		
	Write on the theories of reaction rates.		
	Remember the characteristics of homogeneous and heterogeneous reactions.		
2.0	<b>Cognitive Skills</b>		
2.1	Compare between the different types of complex reactions.	<ul style="list-style-type: none"> <li>• Using brain storming at the beginning of each lecture in order to stimulate the students towards the new topic of the course.</li> <li>• Enhancing open discussion during the lecture.</li> </ul>	<ul style="list-style-type: none"> <li>• Through assignments and other activities.</li> </ul>
2.2	Solve the rate-law expressions for different complex reactions.		
2.3	Give a concise interpretation of photochemical reactions and explosions.		
2.4	Interpret the kinetics of reactions in solutions and the factors affecting it.		
2.5	Compare between the two types of catalytic reactions.		
2.6	Discover the steady-state approximations.		
3.0	<b>Interpersonal Skills &amp; Responsibility</b>		
3.1	Take the personality and responsibility for their own learning	<ul style="list-style-type: none"> <li>• Encourage the solving problems in groups during lecture.</li> <li>• Making open</li> </ul>	<ul style="list-style-type: none"> <li>• Homework and group reports</li> </ul>
3.2	Work effectively in groups and exercise leadership when appropriate.		



3.3	Act ethically and consistently with high moral standards in personal and public forums.	discussion about certain recent topic of the course	
3.4	Community linked thinking		
4.0	<b>Communication, Information Technology, Numerical</b>		
4.1	Communicate effectively in oral and written forms	<ul style="list-style-type: none"> <li>• Lectures</li> <li>• Scientific discussion</li> <li>• Library visits</li> <li>• Web-based study</li> </ul>	<ul style="list-style-type: none"> <li>• web-based student performance systems</li> <li>• individual and group presentations</li> </ul>
4.2	Use information and communication technologies		
4.3	Use basic mathematical and statistical techniques.		
5.0	<b>Psychomotor</b>		
5.1	Not applicable		

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	Assignments and activities.	--	10 %
2	Midterm Exam.	8	30 %
3	Final Exam.	15-16	60 %
4	<b>Total</b>		<b>100 %</b>

#### D. Student Academic Counseling and Support

<p>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)</p> <ul style="list-style-type: none"> <li>• We have faculty members to provide counseling and advice.</li> <li>• Office hours: During the working hours weekly.</li> <li>• Academic Advising for students.</li> </ul>
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#### 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 academic advice.
- 2 hours per week as office hours are available for discussion with the students.

#### E. Learning Resources

1. List Required Textbooks

- \* An Introduction to Chemical Kinetics, Margaret Robson Wright, New York, John Wiley & Sons, 2004.
- \* Kinetics of Chemical Reactions, Guy Marin, Gregory S. Yablonsky, John Wiley, 2011.
- \* Chemical Kinetics, J. Laidler, 4<sup>th</sup> ed., John Wiley & Sons, 1994.

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

- \* Lecture hand outs available on the coordinator website

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

- \* Physical Chemistry, Amazon logo Silbey, R. R. Alberty, M. Bawendi, 4<sup>th</sup> ed., John Wiley & Sons, 2004.
- \* Physical Chemistry, Peter Atkins & Julio de Paula, 10<sup>th</sup> ed., W. H. Freeman and Company, 2014.
- \* Catalytic Chemistry, Bruce C. Gates, New York, John Wiley & Sons, 1992.

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

- <http://en.wikipedia.org/wiki/>
- <http://www.chemweb.com/>
- Websites on the internet relevant to the topics of the course

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

#### 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.)

Appropriate teaching class including white board and data show.

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

Computer halls access for the students will be helpful in doing their tasks during the course.

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

- Student discussion with the instructor allow for continuous feedback through the course progress.
- Student evaluation questionnaires.

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

- Discussions within the group of faculty teaching the course.
- Peer consultation on teaching strategies and its effectiveness.

3 Processes for Improvement of Teaching

- Workshops given by experts on new teaching and learning methodologies will be attended.
- Improving of the teaching strategies by monitoring the evaluation of the students progress through the semester

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.

The course will be evaluated periodically after each semester based on the results of the students and the report presented by the teaching staff that will be discussed with the course coordinator so as to improve the course.

Name of Instructor: **Dr. Ahmed Fawzy**

Signature: \_\_\_\_\_ Date Report Completed: **2017**

Name of Field Experience Teaching Staff \_\_\_\_\_

Program Coordinator: \_\_\_\_\_

Signature: \_\_\_\_\_ Date Received: \_\_\_\_\_

