

COURSE SPECIFICATIONS

Form

Course Title: Nuclear Chemistry

Course Code: 4026852-3



Date: 16-2-2019

Institution: Umm Al-Qura University.

College: Faculty of Applied Science

Department: Department of Chemistry

A. Course Identification and General Information

1. Course title and code: **Nuclear Chemistry / 4026852-3**

2. Credit hours: **3 (theoretical)**

3. Program(s) in which the course is offered: **M. Sc.in Chemistry**

(If general elective available in many programs indicate this rather than list programs)

4. Name of faculty member responsible for the course: **Prof. Abdalla Mohamed Khedr**

5. Level/year at which this course is offered: **3rd / 2nd**

6. Pre-requisites for this course (if any): **None**

7. Co-requisites for this course (if any): **None**

8. Location if not on main campus: **El-Abedyah, El-Azizya, and El-Zaher**

9. Mode of Instruction (mark all that apply):

- | | | | |
|-------------------------------------|-------------------------------------|-------------|--------------------------------------|
| a. Traditional classroom | <input type="checkbox"/> | percentage? | <input type="checkbox"/> |
| b. Blended (traditional and online) | <input checked="" type="checkbox"/> | percentage? | <input type="checkbox" value="80%"/> |
| c. E-learning | <input type="checkbox"/> | percentage? | <input type="checkbox"/> |
| d. Correspondence | <input type="checkbox"/> | percentage? | <input type="checkbox"/> |
| f. Other | <input checked="" type="checkbox"/> | percentage? | <input type="checkbox" value="20%"/> |

Comments:

B Objectives

1. The main objective of this course

The main purpose of this course is to familiarize students with:

- The importance of nuclear chemistry.
- The differences between normal chemical reactions and nuclear reactions.
- Detection of radioactivity and classification of nuclides.
- Types of radioactive decay and penetrating power of radiation.
- Structure and stability of the nucleus (nuclear stability) and radioactive series.
- Nuclear transmutations, nuclear binding energies and rates of radioactive decay.
- Nuclear dating and artificially induced radioactivity.
- Nuclear fission, nuclear fuels and nuclear reactors.
- Nuclear fusion, plasma and plasma confinements.
- Hydrogen bomb and important applications of radioisotopes.

2. Describe briefly any plans for developing and improving the course that are being implemented. (e.g. increased use of the IT or online reference material, changes in content as a result of new research in the field)

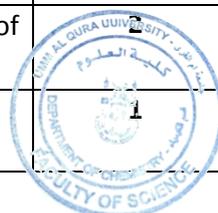
- Changes in content as a result of new research in the field.
- Increased use of IT or web based reference material.
- The use of smart teaching halls for lectures.
- Encourage students to carry out research reports in the field of bioinorganic chemistry using the library, data base services, and/or websites.

C. Course Description (Note: General description in the form used in the program's bulletin or handbook)

Course Description:

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
• General introduction about nuclear chemistry and its importance.	1	3
• Radiation, radioactivity and nuclear reactions - Detection of radioactivity - Nucleons, nuclides and classification.	2	6
• Types of radioactive decay - Penetrating power of radiation	1	3



• Structure and stability of the nucleus (nuclear stability) and radioactive series.	1	3
• Nuclear transmutations - Nuclear binding energies - Rates of radioactive decay.	1	3
• Nuclear dating and artificially induced radioactivity.	1	3
• Nuclear fission and nuclear fuels.	2	6
• Nuclear reactors.	1	3
• Nuclear fusion - Plasma - Plasma confinements.	2	6
• Hydrogen bomb - Important applications of radioisotopes.	2	6

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	42	---	---	---	---	42
	Actual	42	---	---	---	---	42
Credit	Planned	3	---	---	---	---	3
	Actual	3	---	---	---	---	3

3. Individual study/learning hours expected for students per week.

3

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

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 targeted learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy should fit in together with the rest to form an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)

Curriculum Map

Code #	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	Knowledge		
1.1	Know the different types of radioactive decay.	• Lectures	• Written mid-term

1.2	Write on the importance of nuclear chemistry and its applications.	<ul style="list-style-type: none"> • Scientific discussion • Use the library to work duties and a small research on bioinorganic chemistry. • Use of the internet to carry out some reports on course subjects. 	and final exams. <ul style="list-style-type: none"> • Long and short essays.
1.3	Recall the nuclear transmutations, nuclear binding energies and rates of radioactive decay.		
1.4	Describe the nuclear fission, nuclear fusion and types of nuclear reactors.		
1.5	Discuss the basic of hydrogen bomb and penetrating power of radiation.		
2.0	Cognitive Skills		
2.1	Compare between chemical nuclear reactions and normal chemical.	<ul style="list-style-type: none"> • Lectures • Scientific discussion • Library visits • Web-based study 	<ul style="list-style-type: none"> • Mid-term and final exams. Measuring the response to the assignments.
2.2	Estimate the methods of plasma confinements.		
2.3	Summarize the important applications of radioisotopes.		
2.4	Analyze the relation between structure and stability of the nucleus (nuclear stability).		
3.0	Interpersonal Skills & Responsibility		
3.1	Develop the student's ability in self-reliance and responsibility.	<ul style="list-style-type: none"> • Dividing students into groups to carry out collective scientific reports. • Periodic individual duties to develop the skill of taking responsibility and self-reliance. 	<ul style="list-style-type: none"> • Evaluate the results of collective works and duties as well as knowing the contribution of each individual through dialogue and discussion. • Assessment of individual tasks and duties to determine the student's ability to self-reliance.
3.2	Choose the suitable method to solve problems.		
3.3	Operate in team work and accept his college's opinions.		
4.0	Communication, Information Technology, Numerical		

4.1	Perform mathematical calculations and data analysis.	<ul style="list-style-type: none"> • Visiting research centers. • The use of computers in the training room of the department. • Using the internet for collecting data. 	<ul style="list-style-type: none"> • Evaluation of the duties associated with the proper use of numerical and communication skills. • Web-based student performance systems. • Individual and group presentations.
4.2	Use computers and the international information network (the Internet) to perform calculations and to identify recent research relevant to decision sources.		
5.0	Psychomotor(if any)		
5.1	Not applicable.		
5.2			

5. Assessment Task Schedule for Students During the Semester			
	Assessment task (i.e., essay, test, quizzes, 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	Total		100 %

D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic counseling. (include the time teaching staff are expected to be available per week)
 - Office hours: During the working hours weekly.
 - Academic advising for students.
 - Availability of Staff members to provide counselling and advice.

E Learning Resources

1. List Required Textbooks
 - Walter D. Loveland , David J. Morrissey and Glenn T. Seaborg “*Modern Nuclear Chemistry*”, New York, John Wiley & Sons Inc. (2006).
 - David J. Morrissey, Walter D. Loveland and Glenn T. Seaborg “*Introductory Nuclear Chemistry*” New York, John Wiley & Sons Inc. (2001).
2. List Essential References Materials (Journals, Reports, etc.)
 - Journal of Nuclear Materials.

<ul style="list-style-type: none"> • Journal of Nuclear Energy.
<p>3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.</p> <ul style="list-style-type: none"> • http://www.chemweb.com • http://www.sciencedirect.com • http://www.rsc.org
<p>4. Other learning material such as computer-based programs/CD, professional standards or regulations and software.</p> <ul style="list-style-type: none"> • No other requirements.

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.)
<p>1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)</p> <ul style="list-style-type: none"> • Smart classes are needed equipped with Internet access (scheduled for 3 hours once a week).
<p>2. Technology resources (AV, data show, Smart Board, software, etc.)</p> <ul style="list-style-type: none"> • Room equipped with computers, data show and TV.
<p>3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list)</p> <ul style="list-style-type: none"> • No other requirements.

G Course Evaluation and Improvement Procedures

<p>1. Strategies for Obtaining Student's Feedback on Effectiveness of Teaching</p> <ul style="list-style-type: none"> • Confidential completion of standard course evaluation questionnaire. • Focused group discussion with small groups of students.
<p>2. Other Strategies for Evaluation of Teaching by the Instructor or the Department</p> <ul style="list-style-type: none"> • A systematic self-review has the potential for contributing significantly to the instructor's teaching improvement by focusing on the strengths and weaknesses of the course in light of his/her original course objectives. • Visits by other faculty can provide information about the process of teaching. • Colleagues have the expertise to evaluate the quality of a course as evidenced by its content and format (peer reviewers). • The instructor's statement of his/her goals for the course, teaching methods and philosophy, student outcomes, and plans for improvement are a critical source of information.
<p>3. Procedures for Teaching Development</p> <ul style="list-style-type: none"> • Training programs and workshops for Staff member. • Review of strategies proposed. • The application of e-learning. • Providing new tools for learning. • Exchange of experiences internal and external.
<p>4. Procedures for Verifying Standards of Student's Achievement (e.g. check marking by an independent member teaching staff of a sample of student's work, periodic exchange and remarking of tests or a sample of assignments with staff members at another institution)</p> <ul style="list-style-type: none"> • 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 developing it.

- Workshops for teachers of the course.
- Periodic review of the contents of the syllabus and modify the negatives.
- Consult other staff of the course.
- Hosting a visiting staff to evaluate of the course.

Name of Course Instructor: Prof. Abdalla Mohamed Khedr

Signature:  Date Completed: 16/2/2019

Program Coordinator: Dr. Ismail Ibrahim Althagafi

Signature:  Date Received: 16/2/2019

