

National Commission for Academic Accreditation & Assessment

Course Specification

Institution: King Khalid University
College of Science- Chemistry Department

A Course Identification and General Information

1. Course title and code: Nuclear and Radiation Chemistry (Chem 324)
2. Credit hours: 2
3. Program(s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs) B. Sc. Chemistry
4. Name of faculty member responsible for the course Dr/ Gamil Abdullah Al-Hazmi
5. Level/year at which this course is offered: Six Semester, Third Year
6. Pre-requisites for this course (if any)
7. Co-requisites for this course (if any)
8. Location if not on main campus Main Building

B Objectives

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

- The most important differences between the nuclear reaction and the chemical reaction
- The distinction between nuclear and radiation chemistry
- Know the most important nuclear species with some of the examples described so
- Identify the measurement atomic masses

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)

- Continuous development of the contents of the course to keep pace with modern scientific research results
- Guide students to the new references
- Add or delete some Syllabus
- Assigning students some homework to be an ongoing follow-up with the lecturer
- Activating more e-learning for the academic decision
- Assigning students for research on topics relevant to decision

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
Definition students vocabulary of Course scheduled and objectives and explain the study plan and how to distribute scheduled during the semester • Introduction to the decision and the importance of teaching in practical life • The nature of nuclear and radiation chemistry • most of the differences between nuclear and chemical reaction equations	1	2
• fundamental properties of the nucleus • nuclear species • Standards atomic masses • binding energy and how to account • radius of the nucleus and how to account • nuclear Coulomb barrier and the way his account • nuclear powers and nuclear stability	2	4

<ul style="list-style-type: none"> • radioactive decay • sources of natural radiation • types of radiation (alpha, beta and gamma): <ul style="list-style-type: none"> - Energies - spectra • radioactive decay chains 	2	4
<ul style="list-style-type: none"> • detect radioactivity: <ul style="list-style-type: none"> - Gas counters - Proportional counter - Geiger – Muller counter - Scintillation counters • Transuranium elements 	1	2
<ul style="list-style-type: none"> • nuclear reactions, types: <ul style="list-style-type: none"> - Nuclear fission - Nuclear fusion energy released • types of nuclear reactions according to their energies: <ul style="list-style-type: none"> - dispersion elastic - Low-energy reactions - High-energy reactions 	2	4
<ul style="list-style-type: none"> • nuclear fission reactor and its basic components and the idea of its work chain reaction • liquid-drop model 	2	4
<ul style="list-style-type: none"> • uranium enrichment • types of nuclear reactors: <ul style="list-style-type: none"> - Breeder Reactor - Graphite reactor - Uranium reactors - heavy water - Materials testing reactors - Swimming-pool reactors 	1.5	3
<ul style="list-style-type: none"> • biological effect of radiation and prevention • factors controlling the effects of radiation exposure • stages of radiative forcing 	1	2
<ul style="list-style-type: none"> • the effects of radiation • Equivalent dose • Radiation dosimetry and measurement units • the relative biological effect (RBE) 	1.5	3

2 Course components (total contact hours per semester):				
Lecture: 28	Tutorial: 6	Laboratory= 0	Practical/Field work/Internship	Other:

3. Additional private study/learning hours expected for students per week. (This should be an average for the semester not a specific requirement in each week)

3 hours a week to review and resolve duties by calling location scheduled mail

4. Development of Learning Outcomes in Domains of Learning

For each of the domains of learning shown below indicate:

- A brief summary of the knowledge or skill the course is intended to develop
- A description of the teaching strategies to be used in the course to develop that knowledge or skill
- The methods of student assessment to be used in the course to evaluate learning outcomes in the domain concerned

a. Knowledge

(i) Description of the knowledge to be acquired

- 1 - knowledge the physical and chemical properties of the nuclear reaction
- 2 - learn concepts: isotopes, isobars, isotone and isomers
- 3 - How to use the laws to calculate the half-life of radioactive material decayed
- 4 - knowledge of the characteristics of various radiation and how to differentiate between them
- 5 - the importance of radioactive isotopes in our lives and its applications
- 6 - knowledge to enrich uranium and enrichment methods different
- 7 - knowledge of key nuclear reactions and properties
- 8 - knowledge the importance nuclear reactors
- 9 - knowledge of the importance of radiation and disadvantages

(ii) Teaching strategies to be used to develop that knowledge

- Lectures
- Discussions in lectures and try to engage students in
- Give students some homework
- Encourage students to research and writing method.

(iii) Methods of assessment of knowledge acquired

- Through direct questions to students during a lecture
- Through short tests
- By solving homework
- Assigning students research and through discussions through the Internet Forum
- Med term Exams
- A final exam at the end of the semester
- Through electronic tests.

b. Cognitive Skills

(i) Description of cognitive skills to be developed

- The ability to distinguish the nuclear reaction for chemical
- Application of laws concerning radiation in problem solving
- The ability to express the type of radiation in the equation express nuclear reaction
- The skills to deal with radiation most vulnerable in our lives and how to avoid dangers

<ul style="list-style-type: none"> - Practical skills in how to detect radiation - Configure sufficient scientific background on the biological effect of radiation.
<p>(ii) Teaching strategies to be used to develop these cognitive skills</p> <ul style="list-style-type: none"> - Through lectures and oral questions - Permanent discussions during lectures and exercise classes - Use the means available (different references and computers) to develop skills - Provide many of the issues on the course page online.
<p>(iii) Methods of assessment of students cognitive skills</p> <ul style="list-style-type: none"> - Short exams and homework - Student response during lectures - Student performance through quarterly exams and final test.
<p>c. Interpersonal Skills and Responsibility</p>
<p>(i) Description of the interpersonal skills and capacity to carry responsibility to be developed</p> <ul style="list-style-type: none"> - Students in groups cooperation in joint research work - Learn scientific method discuss issues by asking questions and answering them. - Self-reliance in the work of homework and self-study. - Work individually or with a group - Dealing with others honestly and good creation.
<p>(ii) Teaching strategies to be used to develop these skills and abilities</p> <ul style="list-style-type: none"> - Interaction with the students and encourage them to discussion during lectures - Urged the students to accomplish their duties is collective self - The use of modern technologies, such as computers - Encourage outstanding students to help their colleagues - Interest in homework and provide the time needed to review with students.
<p>(iii) Methods of assessment of students interpersonal skills and capacity to carry responsibility</p> <ul style="list-style-type: none"> - Oral discussions during lectures - The extent of their achievement of what they are asked of the duties and research both at the level of individuals or the level of cooperative groups - Follow-up homework - Increasing their love for the material under study.
<p>d. Communication, Information Technology and Numerical Skills</p>
<p>(i) Description of the skills to be developed in this domain.</p> <ul style="list-style-type: none"> - Uses the computer at the solution of homework. - The use of communications technology to search for information and research reports and work.
<p>(ii) Teaching strategies to be used to develop these skills</p>

<ul style="list-style-type: none"> - To encourage students to develop their skills in how to using available means using a technique communications and Information Technology to understand the scientific article - Assigning students some homework in an appropriate manner and the proper use of narrative references.
<p>(iii) Methods of assessment of students numerical and communication skills</p> <p>Follow-up homework especially problems that require the use of certain mathematical relationships</p> <ul style="list-style-type: none"> - Allocate a certain percentage of bicycles to assess duties and the use of e-learning.
<p>e. Psychomotor Skills (if applicable)</p>
<p>(i) Description of the psychomotor skills to be developed and the level of performance required</p> <p>Does not apply</p>
<p>(ii) Teaching strategies to be used to develop these skills</p> <p>Does not apply</p>
<p>(iii) Methods of assessment of students psychomotor skills</p> <p>Does not apply</p>

5. Schedule of Assessment Tasks for Students During the Semester			
Assessment	Assessment task (eg. essay, test, group project, examination etc.)	Week due	Proportion of Final Assessment
1	Med first test	Sixth	20%
2	Med second test	Tenth	20%
3	Homework	During semester	5%
4	Final exam	Final semester	50%
5	Replies during lectures	Continuous	3%
6	Papers and reports	Continuous	2%

D. Student Support

<p>1. Arrangements for availability of 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"> - Ten hours distributed office on weekdays and postings for students - In addition to an unspecified time to contact page of e-learning to decision.
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E Learning Resources

1. Required Text(s) translate Issam Gerges "Nuclear Chemistry Theory and Practice" J. R. Chopoin and J. Rydberg - Mosul University (1985)
2. Essential References : 1- "Radiochemistry" Ali H. Saeed, Basra University (1983). 2- "Basis of Radiation Physics." M. F. Ahmed and A.M. quick - King Saud University - Riyadh (1989). 3 - "Fundamentals of Nuclear Chemistry" S. A. Al-Saadi - second edition – Aman (2002). 4- "Environmental pollution and radiation safety," M. A. Jumah - Second Edition - Riyadh, Saudi Arabia (2004).
3- Recommended Books and Reference Material (Journals, Reports, etc) (Attach List) Nuclear Chemistry, Theory & Application by J.R. Chopain and J. Rydberg.
4. Electronic Materials, Web Sites etc Details scheduled on the University and scheduled page.
5- Other learning material such as computer-based programs/CD, professional standards/regulations No

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (ie number of seats in classrooms and laboratories, extent of computer access etc.)
1. Accommodation (Lecture rooms, laboratories, etc.) - Lectures hall equipped to explain normal and smart can accommodate up to 25 students, enough for an hour and a half each lecture. - Miniature nuclear reactors.
2. Computing resources - Computer labs are equipped with modern - providing computer programs and programs to drawing structures (Chemdraw , Chemoffice.....etc) .
3. Other resources (specify --eg. If specific laboratory equipment is required, list requirements or attach list) No

G Course Evaluation and Improvement Processes

<p>1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching</p> <p>Through a questionnaire assessing students with the decision at the end of the semester.</p> <ul style="list-style-type: none">- Fill Course Evaluation forms, analysis and use of its findings- Direct and continuous contact with students through e-mail and office hours.
<p>2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department</p> <ul style="list-style-type: none">- Analysis of a questionnaire assessing students with the decision at the end of the semester and discuss the observations teachers Scheduled- Revision scheduled file using specialists- The workshops scheduled report.
<p>3 Processes for Improvement of Teaching</p> <ul style="list-style-type: none">- Workshops in teaching methods and education organized by the deanship of skills development- Revision teaching strategy.
<p>4. Processes for Verifying Standards of Student Achievement (eg. 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)</p> <ul style="list-style-type: none">- See the books students answer in the final test and check correct sample by course coordinator or another faculty member has already teaching the course.- Standardized tests and correct collective tests.
<p>5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.</p> <p>Review content scheduled every five years and updated textbook and references.</p>