

COURSE SPECIFICATIONS

Form

Course Title: Bioinorganic Chemistry

Course Code: 4026843-3



Date: 21-10-2018

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: **Bioinorganic Chemistry / 4026843-3**

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

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

- Discuss the properties of biological molecules.
- Explain how metal ions interact with biological environments and how these interaction influences the properties of metal centers.
- Stratify principles of coordination chemistry to clarify how nature tailors properties of metal centers for specific applications.
- Discuss the role of metal ions in medicine.
- Understand current publications in the area of bioinorganic chemistry.

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)

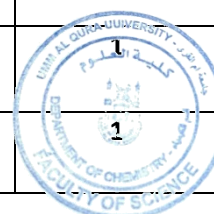
- Increased use of IT or web based reference material.
- Encourage students to carry out research reports in the field of bioinorganic chemistry using the library, data base services, and/or websites.
- Changes in content as a result of new research in the field.
- The use of smart teaching halls for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

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
• Introduction to bioinorganic chemistry. Metal ions in living systems and biologically metals of high importance.	1	3
• Chemical and physical properties of biological molecules.	1	3
• Principles of coordination chemistry and distinctive features of the protein molecule as a ligand.	1	3
• Structure and properties of metalloproteins in electron transport processes.	1	3
• Experimental methods and tools used in bioinorganic chemistry.	1	3



• Bioinorganic chemistry of alkali and alkaline-earth metal ions.	1	3
• Bioinorganic chemistry of iron.	1	3
• Bioinorganic chemistry of copper.	1	3
• Bioinorganic chemistry of zinc and the most important proteins of zinc.	1	3
• Bioinorganic chemistry of other metal ions.	1	3
• Contamination by inorganic chemicals.	1	3
• Interaction of heavy metal ions with biomolecules.	2	6
• Role of metals in medicine.	1	3

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.

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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	Describe the role of metal ions in living systems.	<ul style="list-style-type: none"> • Lectures • 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. 	<ul style="list-style-type: none"> • Written mid-term and final exams. • Long and short essays.
1.2	Explain the experimental methods and tools used in bioinorganic chemistry.		
1.3	Mention the role of metals in medicine.		
1.4	Determine the type of interaction between heavy metal ions and biomolecules.		
1.5	Write on the bioinorganic chemistry of alkali and alkaline-earth metal ions.		
2.0	Cognitive Skills		
2.1	Estimate the metals of high biological importance.	<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	Report the structure and properties of metalloproteins.		
2.3	Design scientific methods and think to solve problems concerning the course.		
2.4	Estimate the distinctive features of the protein molecule as a ligand.		
2.5	Apply the experimental methods and tools in bioinorganic chemistry		
3.0	Interpersonal Skills & Responsibility		
3.1	Operate in team work and accept his college's opinions.	<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	Develop the student's ability in self-reliance and responsibility.		
4.0	Communication, Information Technology, Numerical		
4.1	Use computers and the international	<ul style="list-style-type: none"> • Visiting research 	<ul style="list-style-type: none"> • Evaluation of the

	information network (the Internet) to perform calculations and to identify recent research relevant to decision sources.	centers.	duties associated with the proper use of numerical and communication skills.
4.2	Communicate effectively in oral and written forms.	• The use of computers in the training room of the department.	• Web-based student performance systems.
4.3	Use basic mathematical and statistical techniques to perform data analysis.	• Using the internet for collecting data.	• Individual and group presentations.
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)

- Availability of Staff members to provide counselling and advice.
- Office hours: During the working hours weekly.
- Academic advising for students.

E Learning Resources

1. List Required Textbooks

- Toshikazu Hirao and Toshiyuki Moriuchi, "Advances in Bioorganometallic Chemistry", 1st ed., Elsevier, 2018.
- Dieter Rehder, "Bioinorganic Chemistry", 1st ed., Oxford University Press, 2014
- W. Kaim, B. Schwederski and A. Klein, *Bioinorganic Chemistry -- Inorganic Elements in the Chemistry of Life: An Introduction and Guide*, 2nd Edition, Wiley, New York, 2013.
- J.J.R.F. Da Silva and R.J.P. Williams, *The Biological Chemistry of the Elements: the Inorganic Chemistry of Life*, Oxford University Press, Oxford, 2001.

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2. List Essential References Materials (Journals, Reports, etc.)
<ul style="list-style-type: none"> Journal of Inorganic Biochemistry. Bioinorganic Chemistry and Applications.
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.
<ul style="list-style-type: none"> http://nsdl.niscair.res.in/jspui/ http://www.chemistry.uoc.gr/ http://www.chemie.uni-hamburg.de/
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software.
<ul style="list-style-type: none"> None.

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.)
<ul style="list-style-type: none"> Smart classes are needed equipped with Internet access (scheduled for 3 hours once a week).
2. Technology resources (AV, data show, Smart Board, software, etc.)
<ul style="list-style-type: none"> Roomequippedwithcomputers, data show andTV.
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list)
<ul style="list-style-type: none"> No other requirements.

G Course Evaluation and Improvement Procedures

1. Strategies for Obtaining Student's Feedback on Effectiveness of Teaching
<ul style="list-style-type: none"> Confidential completion of standard course evaluation questionnaire. Focused group discussion with small groups of students.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department
<ul style="list-style-type: none"> 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. 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.
3. Procedures for Teaching Development
<ul style="list-style-type: none"> Providing new tools for learning. Exchange of experiences internal and external. Training programsand workshops for Staff member. Review of strategies proposed. The application of e-learning.

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)
- Periodic exchange and remarking of tests or a sample of assignments with staff at another institution.
 - Check marking by an independent member teaching staff of a sample of student work.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it.
- Consult other staff of the course.
 - Hosting a visiting staff to evaluate of the course.
 - Workshops for teachers of the course.
 - Periodic review of the contents of the syllabus and modify the negatives.

Name of Course Instructor: Prof. Abdalla Mohamed Khedr

Signature:  Date Completed: **21/10/2018**

Program Coordinator: Dr. Ismail Ibrahim Althagafi

Signature:  Date Received: **22/10/2018**

