Fau

FLORIDA ATLANTIC UNIVERSITY

NEW COURSE PROPOSAL Undergraduate Programs

Department Chemistry and Biochemistry

UUPC Approval 2/24/25
UFS Approval
SCNS Submittal
Confirmed
Banner Posted
Catalog

HAILMEDCERY	College College of Science				Banner Posted
UNIVERSITY	(To obtain a course number, contact erudolph@fau.edu)				Catalog
Prefix CHM	(L = Lab Course; C =	Type of Course Course Title			
Combined Lecture/Lab; add if appropriate)		Lecture	Introduction to Bioinorganic Chemistry		
Number	Lab	Lecture	Introduction to Biomorganic Chemistry		
4671	Code				
Credits (See	Grading	Course Descript	t ion (Syllabus mu	st be atta	ached; see <u>Template</u> and <u>Guidelines</u>)
<u>Definition of a Credit Hou</u>	r) (Select One Option)				nt role that metals play in biology of metalloproteins and
3	Regular 💽	metalloenzymes, met	al transport and st	orage, e	electron transfer, small molecule I emphasis will be placed on the role
Effective Date		of 'synthetic metalloe	nzymes' in unders	tanding	the reactivity and spectroscopy of
(TERM & YEAR)	Sat/UnSat 🔾				nts will investigate fundamental sly to biomolecules, study
Fall 2025		metal-protein interact			
	vith minimum grade*	Corequisites			tration Controls (Major,
grade of C	HM 2211 with minimum			College	, Level)
*Default minim	um passing grade is D	Prereqs., Coreqs. &	Reg. Controls a	re enfo	orced for all sections of course
WAC/Gordon R	ule Course		tions Program (General	Education) Requirement
Yes Vo No (Select One Option)					
100		None			
	riteria must be indicated in ral attached to proposal. See	Conoral Education or	sitoria must be ind	li aatad i	n the cyllohus and approval
WAC Guidelines.	ar attached to proposar. See	General Education criteria must be indicated in the syllabus and approval attached to the proposal. See <u>Intellectual Foundations Guidelines</u> .			
Minimum qualifications to teach course					
PhD in Chemistry or					
Faculty Contact/I	List/Attach comm	ist/Attach comments from departments affected by new course			
Zhu-Lin (Sam) Xie/xiez@fau.edu/5612973641 There's no similar course offered by other departments/colleges					ments/colleges
Approved by	1 1 2025.02.06				Date
Department Chair	Andrew Telentia 16:55:32-05'(ю'			2/6/25
College Curriculum Chair					2/13/25
College Dean — White College Dean —					02/13/25
	Gorey Sorge	<i></i>			2/24/25
Undergraduate Studies Dean Dan Meeroff					2/24/25
UFS President					
Provost					

Email this form and syllabus to mjenning@fau.edu seven business days before the UUPC meeting.



Course Description

The course is designed to highlight the important role that metals play in biology and biochemistry. Topics include the structure of metalloproteins and metalloenzymes, metal transport and storage, electron transfer, small molecule transformation, and metals in medicine. Special emphasis will be placed on the role of 'synthetic metalloenzymes' in understanding the reactivity and spectroscopy of metals in their biochemical environment. Students will investigate fundamental principles of coordination chemistry as they apply to biomolecules, study metal-protein interactions, and explore reactivity of metalloenzymes.

Course Objectives/Student Learning Outcomes

The aim of this course is to give students a broad understanding of the roles of metals in biology and explore the principles of inorganic chemistry applied in biological systems. Students will be exposed to advanced spectroscopic and analytical techniques used to study the structure and properties of metal-containing biomolecules and develop critical thinking skills through the analysis of literature and problem-solving in bioinorganic chemistry. By the end of this course, students will:

- Explain the functions of metals in biological processes such as oxygen transport, electron transfer, catalysis, and regulatory mechanisms
- Analyze the coordination environment, ligand properties, and electronic structure of metal centers in biomolecules and synthetic models.
- Demonstrate an understanding of spectroscopic methods used to study bioinorganic systems
- Critically read, interpret, and discuss current research articles in bioinorganic chemistry, identifying experimental approaches and drawing connections to course content

Prerequisites/Corequisites

Prerequisite: CHM 2210 and CHM 2211 with minimum grade of C

Instructional Method

The course is In-Person.

Suggested textbooks/materials

• Inorganic Chemistry by Miessler, Fischer & Tarr

- Principles of Bioinorganic Chemistry by Lippard & Berg
- Biological Inorganic Chemistry: Structure & Reactivity by Bertini, Gray, Stiefel & Valentine

Course Evaluation Method

Undergraduate:

(a) Quiz 1: 100 points

(b) Mid-term 1 200 points + Bonus Points

(c) Quiz 2: 100 points

(d) Mid-term 2: 200 points + Bonus Points (e) Final: 250 points + Bonus Points

Graduate:

(a) Quiz 1: 100 points (b) Mid-term 1 200 points (c) Quiz 2: 100 points (d) Mid-term 2: 200 points (e) Final: 250 points (f) Term project: 200 points

Exams: Two mid-term exams and one final exam will be administered. Mid-term exams are non-cumulative and 80 min in duration. The Final Exam is cumulative (i.e., comprehensive) and 150 min in duration. *In each exam, a few advanced-level questions will be included for graduate students, who will be required to answer them. Undergraduate students will receive bonus points for answering these questions.*

Quizzes: Two quizzes will be given throughout the semester on days which *may not* be announced beforehand. If you are absent for a quiz, you will not be granted a makeup. All quizzes will be graded.

Term project (graduate students only): Each enrolled *graduate student* will be required to study a specialized topic that is not covered in lecture. A list of topics, focusing on a spectroscopic method for studying biomolecules or a specific metal-containing biological system, will be provided for students to choose. Students are expected to conduct a thorough literature review, summarize their findings, and present their analysis. The presentation, approximately 30 minutes in length, will be delivered during the final weeks of the semester. *Questions based on the presentations will be created and included in the final exam.*

Course Grading Scale

The total grades will be normalized to 100 points, and letter grades will be assigned accordingly:

$A \geq 90$	$C-\geq 55$
$A-\geq 85$	$D \geq 50$
$B+ \ge 80$	F < 50
B ≥ 75	

 $B- \ge 70$ $C+ \ge 65$

C ≥ 60

Policy on Makeup Tests, Late Work, and Incompletes

- There will be no makeup mid-term exams except in the following cases, where appropriate documentation is provided: 1. Medical emergency or problem; 2. Death in the immediate family; 3. Participation in an FAU-sponsored academic or athletic activity/event; 4. Required appearance in a civil or criminal court; 5. Military obligations. In cases 1 & 2 the student or a family member must notify the Professor of the incident via email within 48 hours of the missed exam. The student will provide documentation and take the makeup exam at the *earliest possible time* (ordinarily within 1 week of the originally scheduled exam time). In cases 3-5, written documentation of the impending activity must be submitted to the Professor at least 48 hours *prior to* the scheduled exam time. The student must take the makeup exam within 1 week of the originally scheduled exam time.
- The final exam will be given as scheduled. Students will not be permitted to take the final at a different time.
- Any complaints about the exams should be addressed within 5 days the grades are published in CANVAS. No complaints can be made after this period.
- Incomplete Grade: please refer to the FAU Catalog for the policy on "I" grade.

Classroom Etiquette Policy

Please arrive at the classroom *before* class begins to avoid interruptions. Cell phones should be switched off. Students are permitted to use personal computers during class for note-taking and other class-related work only. Thoughtful, courteous questions and discussion about the course material during class time are encouraged. If you have specific questions or comments about your own learning experience, you may speak with the Professor individually about this outside of class times.

Policy on the Recording of Lectures

Students enrolled in this course may record video or audio of class lectures for their own personal educational use. A class lecture is defined as a formal or methodical oral presentation as part of a university course intended to present information or teach students about a particular subject. Recording class activities other than class lectures, including but not limited to student presentations (whether individually or as part of a group), class discussion (except when incidental to and incorporated within a class lecture), labs, clinical presentations such as patient history, academic exercises involving student participation, test or examination administrations, field trips, and private conversations between students in the class or between a student and the lecturer, is prohibited. Recordings may not be used as a substitute for class participation or class attendance and may not be published or shared without the written consent of the faculty member. Failure to adhere to these requirements may constitute a violation of the University's Student Code of Conduct and/or the Code of Academic Integrity.

Attendance Policy

Students are expected to attend all of their scheduled University classes and to satisfy all academic objectives as outlined by the instructor. The effect of absences upon grades is determined by the instructor, and the University reserves the right to deal at any time with individual cases of non-attendance. Students are responsible for arranging to make up work missed because of legitimate class absence, such as illness, family emergencies, military obligation, court-imposed legal obligations or participation in University-approved activities. Examples of University-approved reasons for absences include participating on an athletic or scholastic team, musical and theatrical performances and debate activities. It is the student's responsibility to give the

instructor notice prior to any anticipated absences and within a reasonable amount of time after an unanticipated absence, ordinarily by the next scheduled class meeting. Instructors must allow each student who is absent for a University-approved reason the opportunity to make up work missed without any reduction in the student's final course grade as a direct result of such absence.

Counseling and Psychological Services (CAPS) Center

Life as a university student can be challenging physically, mentally and emotionally. Students who find stress negatively affecting their ability to achieve academic or personal goals may wish to consider utilizing FAU's Counseling and Psychological Services (CAPS) Center. CAPS provides FAU students a range of services – individual counseling, support meetings, and psychiatric services, to name a few – offered to help improve and maintain emotional well-being. For more information, go to http://www.fau.edu/counseling/

Disability Policy

In compliance with the Americans with Disabilities Act Amendments Act (ADAAA), students who require reasonable accommodations due to a disability to properly execute coursework must register with Student Accessibility Services (SAS) and follow all SAS procedures. SAS has offices across three of FAU's campuses – Boca Raton, Davie and Jupiter – however disability services are available for students on all campuses. For more information, please visit the SAS website at www.fau.edu/sas/.

Religious Accommodation Policy Statement

In accordance with the rules of the Florida Board of Education and Florida law, students have the right to reasonable accommodations from the University in order to observe religious practices and beliefs regarding admissions, registration, class attendance, and the scheduling of examinations and work assignments. University Regulation 2.007, Religious Observances, sets forth this policy for FAU and may be accessed on the FAU website at www.fau.edu/regulations. Any student who feels aggrieved regarding religious accommodations may present a grievance to the executive director of The Office of Civil Rights and Title IX. Any such grievances will follow Florida Atlantic University's established grievance procedure regarding alleged discrimination.

Code of Academic Integrity

Students at Florida Atlantic University are expected to maintain the highest ethical standards. Academic dishonesty is considered a serious breach of these ethical standards, because it interferes with the university mission to provide a high quality education in which no student enjoys an unfair advantage over any other. Academic dishonesty is also destructive of the university community, which is grounded in a system of mutual trust and places high value on personal integrity and individual responsibility. Harsh penalties are associated with academic dishonesty. For more information, see <u>University</u> Regulation 4.001.

Time Commitment Per Credit Hour

For traditionally delivered courses, not less than one (1) hour of classroom or direct faculty instruction each week for fifteen (15) weeks per Fall or Spring semester, and a minimum of two (2) hours of out-of-class student work for each credit hour. Equivalent time and effort are required for Summer Semesters, which usually have a shortened timeframe. Fully Online courses, hybrid, shortened, intensive format courses, and other non-traditional modes of delivery will demonstrate equivalent time and effort.

Grade Appeal Process

You may request a review of the final course grade when you believe that one of the following conditions apply:

- There was a computational or recording error in the grading.
- The grading process used non-academic criteria.
- There was a gross violation of the instructor's own grading system.

 <u>University Regulation 4.002</u> of the University Regulations contains information on the grade appeals process

Title IX Statement

In any case involving allegations of sexual misconduct, you are encouraged to report the matter to the University Title IX Coordinator in the Office of Civil Rights and Title IX (OCR9). If University faculty become aware of an allegation of sexual misconduct, they are expected to report it to OCR9. If a report is made, someone from OCR9 and/or Campus Victim Services will contact you to make you aware of available resources including support services, supportive measures, and the University's grievance procedures. More information, including contact information for OCR9, is available at https://www.fau.edu/ocr9/title-ix/. You may also contact Victim Services at victimservices@fau.edu or 561-297-0500 (ask to speak to an Advocate) or schedule an appointment with a counselor at Counseling and Psychological Services (CAPS) by calling 561-297-CAPS.

Tentative Lecture schedule

D 4		Lecture Schedule	
Date			
8/19 T	L1	Overview of Bioinorganic Chemistry	
8/21 R	L2	Properties of Biological Molecules	
8/26 T	L3	Principles of Coordination Chemistry Related to Bioinorganic Research	
8/28 R	L4		
9/2 T	L5	Binding, Stability, and Folding of Metalloproteins	
9/4 R	L6	Bioinorganic Cofactors and Metal Clusters	
9/9 T	L7	Metal Ion Transport and Storage	
9/11 R	L8	Electron Transfer Proteins	
9/16 T	Review		
9/18 R	Mid-Term 1		
9/23 T	L9	Dioxygen Carrier Proteins	

9/25 R	L10			
9/30 T	L11	D'amount Antique François		
10/2 R	L12	Dioxygen Activation Enzymes		
10/7 T	L13	Dioxygen Reduction to Water: Enzymes and Mechanisms		
10/9 R	L14	Oxygen Metabolism: Superoxide Dismutase and Reductase		
10/14 T	L15	Dioxygen Production: Photosynthesis		
10/16 R	L16	Dioxygen Production: Photosystem II		
10/21 T	Review			
10/23 R	Mid-Term 2			
10/28 T	L17	Hydrogenases		
10/30 R	L18			
11/4 T	L19	Nitrogenases		
11/6 R	L20	Metalloenzymes with radical intermediates		
11/11 T	Veteran's Day	No Class		
11/13 R	L21	Metals in Medicine: Diagnostic Agents and Anticancer Metallodrugs		
11/18 T	L22	Student Presentation		
11/20 R	L23			
11/25 T	Review			
12/4 R	Final			