

Spring 2019

CHEM 412-102: Inorganic Reactions and Processes

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Chemistry:
CHEM-610 – Advanced Inorg. Chem
CHEM 412 - Inorg Reactns & Processes
Spring 2019 Course
Syllabus

[NJIT Academic Integrity Code](#): All Students should be aware that the Department of Chemistry & Environmental Science (CES) takes the University Code on Academic Integrity at NJIT very seriously and enforces it strictly. This means that there must not be any forms of plagiarism, i.e., copying of homework, class projects, or lab assignments, or any form of cheating in quizzes and exams. Under the University Code on Academic Integrity, students are obligated to report any such activities to the Instructor.

COURSE INFORMATION

Course Description:

This course is intended for Chemistry, Materials Science, Physics, and Geology majors, and is designed to prepare students for further research in Inorganic Chemistry, Materials Science, Nanotechnology, Renewable Energy or, more generally, employment in physical or materials sciences fields. The course content will include advanced concepts in structure, bonding, and chemical/physical properties of inorganic compounds, understanding of which is central to the study of all areas of chemistry. The course will rely both on the books and literatures. Not all material in the text book will be covered and not all material covered will be found in the textbooks. Additional reading from primary literatures and presenting will be an integral part of this course. This course cannot be exhaustive in its coverage of organometallic chemistry but it is hoped that it will serve as a rational foundation of self-development in further studies.

Number of Credits: 3

Prerequisites:

General Chemistry, Organic Chemistry are required; General Physics, Calculus, and Physical Chemistry is recommended.

Course-Section and Instructors

Course-Section	Instructor
CHEM 412-102	Chaudhery Mustansar Hussain
CHEM 610 - 002	Chaudhery Mustansar Hussain

Office Hours for All Chemistry & Environmental Science Instructors: [Spring 2019 Office Hours and Emails](#)

Required Textbook:

Suggested Text book: Robert Crabtree, Edition 6th The Organometallics of Transition Metals

Suggested Text book: Robert Jordan, Reaction Mechanisms of Inorganic and Organometallic systems

Suggested Text book: F. Albert Cotton, Chemical Applications of Group Theory

Other useful course materials: peer reviewed Journal papers in: Journal of American Chemical Society; Inorganic Chemistry; Nature Materials; Energy & Environmental Science

University-wide Withdrawal Date: The last day to withdraw with a W is Monday, November 12, 2018. It will be strictly enforced.

Learning Outcomes:

Upon completion of Chemistry 610, graduate students should be able to:

- Apply knowledge obtained in this class to problem solving and critical thinking in the field of Inorganic Chemistry.
- Master Inorganic Chemistry concepts, knowledge, histories
- Understand the direction of future Inorganic Chemistry
- Utilize knowledge gained from this class to perform logic thinking and utilize concepts and theories to predict the properties of common/general Inorganics/Organometallics.
- Grasp the advanced knowledge to characterize inorganic materials and organometallic molecules by physical and spectroscopic means, including IR, Raman, NMR, XPS, XRD, TEM etc.
- Develop the skill set necessary to continue on to further Inorganic Chemistry graduate Research.

Upon completion of Chemistry 412, undergraduate students should be able to:

- Apply knowledge obtained in this class to problem solving and critical thinking in the field of Inorganic Chemistry.
- Master Inorganic Chemistry concepts, histories, knowledge and know the direction of future Inorganic Chemistry
- Utilize knowledge gained from this class to perform logic thinking and utilize concepts and theories to predict the properties of common Inorganics/Organometallics.
- Grasp the advanced knowledge to characterize inorganic materials and organometallic molecules by physical and spectroscopic means, including IR, Raman, NMR, XPS, XRD, TEM etc.

POLICIES

All CES students must familiarize themselves with, and adhere to, all official university-wide student policies. CES takes these policies very seriously and enforces them strictly.

Grading Policy: The final grade in this course will be determined as follows:

Class participation& Group Discussion-GROUP BASIS	5%
Home Work-must be submitted in <u>hard copy</u> and before next class-INDIVIDUAL BASIS	5 %
Poster-INDIVIDUAL BASIS	10%
Paper-INDIVIDUAL BASIS	10%
Final Project/Presentation -Last Class- GROUP BASIS Work	10%
Midterm Exam-INDIVIDUAL BASIS (Close Book)	30%
Final Exam-INDIVIDUAL BASIS (Close Book)	30 %
Total	100%

Your final letter grade in this course will be based on the following tentative curve:

Grading: A: 90-100%, B: 80-89%, C: 70-79%, D: 60-69%, F: less than 60

Attendance Policy: Attendance at classes will be recorded and is **mandatory**. Each class is a learning experience that cannot be replicated through simply “getting the notes.”

Homework Policy: Homework is an expectation of the course. The homework problems set by the instructor are to be handed in for grading and will be used in the determination of the final letter grade as described above.

Exams: There will be two midterm exams held in class during the semester and one comprehensive final exam. The following exam periods are tentative and therefore possibly subject to change:

Midterm Exam	March 12, 2019
Final Exam Period	December 15 - 21, 2018

The final exam will test your knowledge of all the course material taught in the entire course.

Makeup Exam Policy: There will normally be **NO MAKE-UP QUIZZES OR EXAMS** during the semester. In the event that a student has a legitimate reason for missing a quiz or exam, the student should contact the Dean of Students office and present written verifiable proof of the reason for missing the exam, e.g., a doctor’s note, police report, court notice, etc. clearly stating the date AND time of the mitigating problem. The student must also notify the CES Department Office/Instructor that the exam will be missed so that appropriate steps can be taken to make up the grade.

Cellular Phones: All cellular phones and other electronic devices must be switched off during all class times. Such devices must be stowed in bags during exams or quizzes.

ADDITIONAL RESOURCES

Chemistry Tutoring Center: Located in the Central King Building, Lower Level, Rm. G12. Hours of operation are Monday - Friday 10:00 am - 6:00 pm. For further information please click [here](#).

Accommodation of Disabilities: Office of Accessibility Resources and Services (*formerly known as Disability Support Services*) offers long term and temporary accommodations for undergraduate, graduate and visiting students at NJIT.

If you are in need of accommodations due to a disability please contact Chantonette Lyles, Associate Director at the Office of Accessibility Resources and Services at 973-596-5417 or via email at lyles@njit.edu. The office is located in Fenster Hall Room 260. A Letter of Accommodation Eligibility from the Office of Accessibility Resources Services office authorizing your accommodations will be required.

For further information regarding self-identification, the submission of medical documentation and additional support services provided please visit the Accessibility Resources and Services (OARS) website at:

- <http://www5.njit.edu/studentuccess/disability-support-services/>

Important Dates (See: [Fall 2019 Academic Calendar, Registrar](#))

January	21	Monday	Martin Luther King, Jr. Day
January	22	Tuesday	First Day of Classes
February	1	Friday	Last Day to Add/Drop a Class
March	17	Sunday	Spring Recess Begins - No Classes Scheduled - University Open

March	24	Sunday	Spring Recess Ends
April	8	Monday	Last Day to Withdraw
April	19	Friday	Good Friday - No Classes Scheduled - University Closed
May	7	Tuesday	Last Day of Classes
May	8	Wednesday	Reading Day 1
May	9	Thursday	Reading Day 2
May	10	Friday	Final Exams Begin

Course Outline

Major topics will include:

- 1) Introduction to Current Inorganic Related Topics: Inorganic Materials, Renewable Energy, Catalysis, Nanotechnology, Environmental Inorganics, Semiconductor and Functional Materials
- 2) Structure, Bonding and Properties of Inorganic Solid Materials/Semiconductors (solid state chemistry, semiconductor principles, including descriptive crystal chemistry and X-ray crystallography)
- 3) Coordination Molecular Compounds/Organometallics (including 18-electron rule, oxidation state, molecular orbital theory, symmetry, group theory, and vibrational/electronic spectroscopy.)
- 4) Current Advanced Topics in Inorganics/Organometallics
- 5) Bio-organometallic Chemistry
- 6) Physical Methods to Characterize Inorganics/Organometallics

