Lehman College
City University of New York
Department of Chemistry

Inorganic Chemistry CHE 442
Fall 2018

Instructor:
Professor: Andrei Jitianu-PhD

Office Hours: Wednesday 1:30 -2:30 PM
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Course Description

CHE 442: **Introduction to Inorganic Chemistry.**
Two lectures are offered twice per week – Monday and Wednesday 4:30-5:45 pm (6:00pm)
3 hours / 3 credits
Inorganic chemical principles including concepts of bonding, intermolecular forces, acid-base behavior, and reduction-oxidation properties. PREREQ: CHE 234 and 249.

Place of course in degree program
This course is a degree program requirement for Chemistry.

Academic or Learning Objectives
- After completing this course students should be able to:
- Carefully state and apply the major basic concepts of inorganic chemistry.
- Understand the periodicity of chemical and physical properties.
- Understand how the nature of chemical bonding influences the molecular structure.
- Recognize the principles of the reduction-oxidation processes and differentiate these from other chemical processes.
- Differentiate between the main types of chemical reactions.
- Describe the Main Group Elements. Synthesis, structure, physical properties, variations in bonding motifs, acid - base character, and reactivity of the elements and their compound
- Differentiate between normal inorganic compounds and coordinative complexes

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Required Readings
Descriptive Inorganic Chemistry Six Edition by Geoff Rayner-Canham and Tina Overton et al, at W.H. Freeman and Company, New York, 2014, ISBN-10 1-4641-2557-0 or ISBN-13: 978-1-4641-2557-7

Course Requirements and Grading
For this class there will be 2 regular exams and a Final exam.
The final grade will be established as follows:

Electronic Homework	- 10%
Exams 1 and 2	- 25% each
Final exam	- 40%

Each student's grade will be determined by counting each regular exam as 25% of the final grade and the final exam as 50% of the final grade. In the event a student misses a regular exam, the 25% for that exam will be included in the final exam. In other words, if a student were to miss **Exam 2**, that student's final exam would count 65%. A student cannot miss more than one exam (Exams 1 or 2). **No make-up exams will be given.** Additional information about the Homework grading and deadlines will be distributed.

Attendance Policy

Students **MUST** be present at every class.

A student cannot miss more than one regular exam. For students to pass the course they must be present at the Final Exam.

Accommodating Disabilities

Lehman College is committed to providing access to all programs and curricula to all students. Students with disabilities who may need classroom accommodations are encouraged to register with the Office of Student Disability Services. For more information, please contact the Office of Student Disability Services, Shuster Hall, Room 238, phone number, 718-960-8441.

Classroom Policy:

Food policy: Food and drink are not allowed in the classroom.

Cell Phone Policy. Cell phones are disruptive, even in vibrate mode. Make sure your cell phones are in silent mode before class starts. Text-messaging during class is also highly disruptive (besides absolutely rude) and is forbidden. If a cell phone rings during class, lecture will be stopped, until the student turns the device off. The following penalties are applicable:

> **5 pt penalty** if your cell phone rings while the instructor is in class; **10 pt penalty** if you continue the disturbance (e.g., by letting it ring again); **15 pt penalty** for the 1st ring that occurs at any future class session.

Electronic devices Policy No electronic devices can be used or kept accessible during examinations; this includes, but is not limited to graphing calculators, smart watches, any SMART Devices, i-Phones, cell-phones, beepers, iPods, MP3 players, recorders, PDAs, **Bluetooth** and other computing or music devices. Only **basic scientific** calculators will be allowed

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Academic Integrity

While honest scholarship is time-consuming and often requires hard work, it is also the primary process by which students learn to think for themselves. Faculty members must teach respect for methods of inquiry within the various disciplines and make assignments that will encourage honest scholarship; students in turn must uphold a standard of honesty within the College, thereby affirming the value and integrity of their Lehman degree. The following definitions and procedures govern cases involving undergraduate student work.

The most common forms of academic dishonesty are cheating and plagiarism. Cheating is the use or attempt to use unauthorized material, information, notes, study aids, devices, or communication during an academic exercise (for example, using unauthorized books, papers, or notes during an examination; or procuring, distributing, or using unauthorized copies of examinations). Plagiarism means the failure to give credit for the source of another's words or ideas, including but not limited to books, articles, interviews, and multimedia and electronic sites, or—as in the use of borrowed or purchased papers—passing off another person's work as one's own. (Section 213-b of the New York State Education Law prohibits the sale of term papers, essays, and research reports to students enrolled in a college.) Common forms of cheating and plagiarism are highlighted in this Bulletin.

Academic dishonesty is a serious violation of the accepted values of the College. When questions of a breach of academic integrity arise, instructors will inform the students of their suspicions and provide the student with a Faculty Report Form for Incidents of Suspected Academic Dishonesty. The instructor must remember that a student's failure to respond to charges of academic dishonesty is not in and of itself an indication of guilt. The report will include an explanation of the incident, the instructor's intended academic sanction, and an indication whether or not the instructor is recommending that the College undertake disciplinary proceedings pursuant to Article 15 of the Board of Trustees Bylaws.

Academic sanctions may include but are not limited to the following:

1. **a grade of F for the course**.

Disciplinary procedures are governed by Article 15 of the Board of Trustees Bylaws. In the event the student is found guilty of academic dishonesty by a Faculty-Student Disciplinary Committee, penalties that may be imposed include but are not limited to: 1) suspension from the College or 2) expulsion from the College. Although the Office of the Vice President for Student Affairs will be guided by the recommendation of the instructor, it reserves the right to seek disciplinary sanctions under the disciplinary procedures.

Should the instructor become convinced that the suspicions are unfounded, no further action will be taken and the Faculty Report Form will be destroyed. If the suspicions are founded and if both the student and the instructor are willing, they may agree upon a resolution. Subsequently the instructor will present the completed Faculty Report Form, including the charges and resolution, to the department chair who must forward the appropriate copies of the form to the Office of Academic Standards and Evaluation, and the Office of the Vice President for Student Affairs. If no agreement is reached, the instructor must allow a student to complete all coursework until the following appeal process has been completed.

- The first step in the appeals process is for the instructor to file the Faculty Report Form with the chair. If the term is completed, the instructor may assign a grade that reflects the intended sanction but must also provide a final grade that does not include the intended sanction if the charges are not upheld.
- If the charges are for cheating, then the chair will submit the charges to the Office of the Vice President for Student Affairs. If the charges are for plagiarism, the chair will appoint a committee of three Lehman College faculty members, which will adjudicate the matter within three weeks by majority vote. If the chair is the instructor in question, the senior member of the department Personnel and Budget Committee will act for the chair. The committee will provide written notification of its decision to the chair, who will forward this recommendation and the Faculty Report Form to the Office of the Vice President for Student Affairs.
- The Office of the Vice President for Student Affairs will review the recommendations of the instructor and the committee for possible disciplinary sanctions and provide a written notification of its decision to the department chair, the student, the instructor, and the Office of Academic Standards and Evaluation. Either the instructor or the student has the right, within three weeks of receipt of notification, to appeal the department decision in writing to the Committee on Admissions, Evaluation, and Academic Standards, which will act as adjudicator of last resort.

Should any part of the three-week period fall outside the regular semester, the first three weeks of the next regular semester shall apply.

The Office of Academic Standards and Evaluation will keep all records of such proceedings on file until the student's graduation, at which time they will be destroyed.

As a result of a second upheld charge of academic dishonesty, disciplinary procedures will be pursued by the Office of the Vice President for Student Affairs as governed by the procedures under Article 15 of the Board of Trustees' Bylaws.

The following definitions and examples are adapted from the CUNY Policy on Academic Integrity.

Cheating is the unauthorized use or attempted use of material, information, notes, study aids, devices, or communication during an academic exercise. Examples of cheating include, but are not limited to the following:

- Copying from another student during an examination or allowing another student to copy your work.
- Unauthorized collaboration on a take-home assignment or examination.
- Using illegal notes during a closed-book examination.
- Taking an examination for another student, or asking or allowing another student to take an examination for you.
- Changing a graded exam and returning it for more credit.
- Submitting substantial portions of the same paper for more than one course without informing each instructor.
- Preparing answers or writing notes in a blue book (exam booklet) before an examination.
- Allowing others to research and write assigned papers or do assigned projects, including the use of commercial term paper services.
- Giving assistance to acts of academic misconduct or dishonesty.
- Fabricating data (all or in part).
- Submitting someone else's work as your own.
- Unauthorized use during an examination of any electronic devices, such as cell phones, palm pilots, computers, or other technologies to send or retrieve information.

Plagiarism is the act of presenting another person's ideas, research, or writings as your own. Examples of plagiarism include, but are not limited to the following:

- Copying another person's actual words without the use of quotation marks *and* citations.
- Presenting another person's ideas or theories in your own words without acknowledging the source.
- Using information that is not common knowledge without acknowledging the source.
- Failing to acknowledge collaborators on assignments.
- Purchasing or downloading term papers online.
- Paraphrasing or copying information from the Internet without citing the source.
- "Cutting and pasting" from various sources without proper attribution.

Course topics

The following topics will be covered:

Periodic table; Covalent bonding; Models;Metallic Bonding; Ionic bonding; Solvents; Acid base behavior; Oxidation Reduction; Periodic Trends; Elements and their compounds.

Nr. Crt.	Subject
1.	**Chapter 1. The electronic Structure of the Atom** Quantum model Shapes of the atomic orbitals
2.	Polyelectronic atom; Magnetic properties of the atom
3.	**Chapter 2. An overview of Periodic Table** Organization of the modern Periodic Table Existence of the elements
4.	Isotopes Classification of the elements Periodic properties
5.	**Chapter 3. Covalent bonding** Models of covalent bonding Introduction to molecular orbitals Diatomic molecules
6.	Lewis Structure Partial Bond order Formal Charge VSEPR
7.	Intermolecular Forces Covalent Bonding across the Periodic Table
8.	**Chapter 4. Metallic Bonding** Metallic Bonding;
9.	Bonding models Unit cells;
10.	Alloys Magnetic Properties of Metals
11.	**Chapter 5. Ionic Bonding** The ionic Model and the Size of Ions Hydrogenated Salts
12.	Crystal structure Polyatomic Ions
13.	**Exam 1**
14.	**Chapter 7. Solvent Systems and Acid-Base Behavior** Solvents; Bronsted-Lowry Acids Bronsted-Lowry Bases
15.	Trends in Acid-Base reactions; Pearson Hard-Soft Acid base Concepts Applications
16.	**Chapter 9. Periodic Trends**

	Group trends Periodic trends in Bonding Isoelectronic series in Covalent compounds Isomorphism in Ionic Compounds Diagonal relationships
17.	**Chapter 10. Hydrogen and Chapter 11 The group 1 Elements** Properties of Hydrogen Hydrides Future of the Alkali Metal Compounds Solubility Salts
18.	**Chapter 12 The group 2 Elements: The Alkaline Earth Metals** Group trends Features of Alkaline Earth Metal Compounds Compounds Cermet Biomineralization – Biological aspects
19.	**Chapter13. The group 13 Elements** Group trends Borides; Aluminum Halides Aluminum Potassium sulfate Aluminides
20.	**Chapter14. The group 14 Elements** Group trends; Contrasts in the chemistry of Carbon and Silicon; Carbonates; Cyanides; Silicates Tin and lead compounds
21.	**Chapter15. The group 15 Elements : The Pnictogens** Group Trends Contrasts in the chemistry of Nitrogen and Phosphorous Chemistry of Nitrogen Phosphorous and its compounds
22.	**Chapter16. The group 16 Elements : The Chalcogens** Group Trends Contrasts in the chemistry of Oxygen and Sulfur Trends in oxide properties; Sulfur and its compounds; Acids;
23	**Exam 2**
24.	**Chapter17. The group 17 Elements : The Halogens** Group Trends; Contrasts in the chemistry of Fluorine and Chlorine; Overview of Chlorine chemistry; Oxoacids and Oxyanions;
25.	**Chapter18. The group 18 Elements : The Noble Gases** Group Trends; Helium

	Xenon Fluorides; Xenon Oxides; Other Noble Gas Compounds
26.	**Chapter 20. Properties of the 3d Transition Metals** Overview of the 3d Transition Metals; Elements and their compounds; Trends;
27.	**Chapter 21. Properties of the 4d and 5d Transition Metals** Comparison of Transition Metals; Overview of the 4d and 5d Transition Metals; Elements and their compounds; Trends;
28.	**Chapter 19. Transition Metal complexes** Introduction in transition metal complexes Nomenclature Stereochemistry
	Final exam