Instructor
Professor Andrei Jitianu –PhD
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Course Description
CHE-442/542 - Advanced Inorganic Chemistry,
Two lectures are offered twice per week – Tuesday and Thursday 4:30-5:45 pm (6:00pm)
3 hours / 3 credits
Developments in modern chemical theories in the interpretation and explanation of the properties of, and relationships existing between, the elements and their compounds. The aim of this class is to provide a comprehensive introduction to the diverse discipline of inorganic chemistry that deals with the properties of all of the elements in the periodic table.

Prerequisites
CHE 234
Corequisites or Prerequisites:
CHE 334 or 344 and 443.

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

Academic or Learning Objectives
Student Learning Outcomes: After completing this course students should be able to:
- Carefully state and be able to apply the major basic concepts of inorganic chemistry. To understand the periodicity of chemical and physical properties
- Understand the chemical bonding and molecular structure using the main molecular models and to correlate theses with the molecular shape.
- Be able to apply the concepts of group theory in the spectroscopy of inorganic molecules.
- Understand the structure of the inorganic solids.
- Understand structure of coordination compounds, to write the chemical formulas of these and to know the main theories which explain the bonding in complexes and electronic spectra.
- Be able to write chemical equations in a precise, effective, and understandable way.

Required Readings
Course Requirements and Grading
For this class there will be 3 regular exams and a Final exam.  The final grade will be established as follows:

    Exams 1 to 3 - 60%:
    Final exam    - 40%

Each student’s grade will be determined by counting each regular exam as 20% of the final grade and the final exam as 40% of the final grade.  In the event a student misses a regular exam, the 20% for that exam will be included in the final exam.  In other words, if a student were to miss Exam 2, each of the remaining 2 exams would count for 20% each of the final grade and that student’s final exam would count 60%.  A student cannot miss more than one exam (Exams 1 to 3).  No make-up exams will be given.

Attendance Policy
Students should be present at every class.  A student cannot miss more than one regular exam.  For the final grade the presence at the Final Exam is compulsory.

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 drinks 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 will shut down the device and the following penalties are applicable

      5 pts penalty if your cell phone rings while I am in class; 10 pts penalty if you continue the disturbance (e.g., by letting it ring again); 15 pts penalty for 1st ring on 2nd occasion;

  Electronic devices Policy  No electronic devices can be used or kept accessible during examinations; this includes, but is not limited to i-Phones, cell-phones, beepers, iPods, MP3 players, tape-recorders, PDAs, bluetooth and other computing or music devices.  Only basic calculators will be allowed.

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.

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**Course topics**
The following topics will be covered:
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| 1. | Chapter 1. Atomic structure | Classification of the elements  
The structure of hydrogen atoms* |
| 2. | Many electron atoms | Atomic parameters (radii variation; ionization Energy; Electron affinity;  
Electronegativity and Polarizability) |
| 3. | Chapter 2. Molecular structure and bonding | Lewis structures |
| 4. | | Valence-bond theory  
Molecular Orbital theory |
| 5. | Chapter 4. Acids and bases | Brønsted acidity; Characteristics of Brønsted acids;  
Lewis acidity;  
Reaction and properties of Lewis acids |
| 6. | Chapter 5. Oxidation and Reduction | Reduction potential;  
Redox Stability;  
Chemical extraction |
| 7. | Exam 1 | |
| 8. | Chapter 3. The structures of simple solids | Unit cell; crystal structure; packing;  
The structure of metals and alloys;  
The electronic structure of solids; |
| 9. | Ionic solids;  
The energetics of ionic bonding | |
| 10 | Chapter 23. Solid-state and materials Chemistry | Defects; Nonstoichiometric compounds and solid solutions;  
Synthesis of Materials; Inorganic pigments; Semiconductor chemistry; |
| 11 | Chapter 6. Physical techniques in Inorganic Chemistry | Chemical Analysis  
X-ray Diffraction  
Resonance techniques |
| 12 | | Ionization-based techniques  
Absorption spectroscopy |
| 13 | Chapter 7. Molecular Symmetry* | Symmetry operations; Symmetry elements; Polar and Chiral Molecules* |
| 14 | | Symmetry of orbitals; The symmetry of molecular vibrations;  
Representations* |
<p>| 15 | Chapter 24. Nanomaterials, nanoscience and nanotechnology | Terminology; Optical properties; Characterization and fabrication; Self-assembled nanostructure; Inorganic-organic nanocomposites |</p>
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<td>16.</td>
<td><strong>Exam 2</strong></td>
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| 17. | **Chapter 8. An Introduction to coordination compounds**  
Constitution and geometry; Ligands and nomenclature; |
| 18. | **Isomerism and chirality** |
| 19. | **Chapters 9 & 10**  
Hydrogen  
The group 1 elements |
| 20. | **Chapters 11 & 12**  
The group 2 elements  
The group 13 elements |
| 21. | **Chapters 13 & 14**  
The group 14 elements  
The group 15 elements |
| 22. | **Chapters 15, 16 & 17**  
The group 16 elements  
The group 17 elements  
The group 18 elements |
| 23. | **Chapter 18** The d-block metal |
| 24. | **Exam 3** |
| 25. | **Chapter 19. d-Metal complexes: electronic structure and spectra**  
Electronic structure |
| 26. | Crystalline field theory |
| 27. | Ligand-field theory;  
Electronic spectra; Electronic spectra of atoms; Electronic spectra of complexes |
| 28. | **Chapter 20. Coordination chemistry: reactions of complexes** Ligand substitution reactions; Ligand substitution in square-planar complexes; Ligand substitution in octahedral complexes; |
|   | **Final exam** |