



SCHOOL OF PHARMACY AND HEALTH SCIENCES

COURSE:	CHE 1305A: Basic Inorganic Chemistry
LECTURER :	Dr Naumih Noah
CLASS DAYS/TIME:	M/W 9.00 – 10.40AM
CLASS VENUE:	SC 5
LAB VENUE:	LAB C and LAB C
CREDIT UNIT:	4.5
OFFICE HOURS :	M/W 8.00 – 9.00AM , T/R 8.00 – 9.00 AM, 1.00 – 3.00 PM,
CONTACT :	mnoah@usiu.ac.ke

COURSE DESCRIPTION:

This course introduces the students to basic the basic principles and methodologies of inorganic Chemistry. It also creates a sound starting point for the study and comprehension of the correlation between structure and the properties of materials which students will have to study in more detail in their years in pharmacy school.

Link to University Mission and Program Learning Outcomes:

1. Higher Order Thinking

- Collect, analyze and evaluate environmental data/information to formulate valid conclusions.
- Demonstrate the ability to reason critically and creatively in an inter-disciplinary context.

2. Literacy

- Apply basic scientific, quantitative and technological skills in a changing environment.

3. Preparedness for Career

- Apply intellectual knowledge to practical tasks.

Program Learning Outcomes

By the end of their training the graduates should be able to:

1. Plan, organize and control the manufacturing, compounding, packaging and quality of pharmaceutical products.
2. Plan, organize and manage the procurement, storage and distribution of pharmaceutical materials and products.
3. Interpret and uphold the laws, regulations and ethics that govern the practice of pharmacy.
4. Provide pharmacist-initiated care to patients and ensure the rational use of medicines.
5. Provide information, advice and education on disease, health, community health and medicines-related issues.

- Participate in pharmaceutical and medical research and evaluate critically new therapies and current advances in formulation and modes of drug action to ensure the optimal selection and use of medicines.

Course Learning Outcomes:

Upon completion of this course, students should be able to:

- State the range and chemistry of elements in the IUPAC periodic table and their compounds
- Measure and solve problems using chemical methods and other scientific methods in inorganic chemistry
- Use procedures and instrumental methods applied in inorganic chemistry
- Identify, purify, estimate and prepare important inorganic compounds.
- Scientifically and methodically plan, develop, conduct, review and report experiments
- Professionally and safely discharge responsibilities related to working with inorganic systems
- Explain the role of inorganic chemistry in the pharmaceutical sciences

COURSE CONTENT

WEEK	TOPIC	Activity	Learning outcomes	READING
Week 1	Laboratory Safety Chemical Safety	Lectures and Class Discussion	6,7	
Week 2	<ul style="list-style-type: none"> • Matter and measurement: • Matter: <ul style="list-style-type: none"> • Physical State and Chemical • Constitution • Physical Measurements <ul style="list-style-type: none"> • Measurement and Significant Figures • SI Units • Derived Units • Units and Dimensional Analysis • (Factor-Label Method) 	Lectures and Class Discussion	1, 2 and 7	Ebbing and Gammon, pg 8-25
Week 3	Atoms, Molecules and Ions <ul style="list-style-type: none"> • Atomic Theory of Matter, • Structure of the Atom, • Nuclear Structure, • Isotopes, • Atomic Masses, 	Lectures and class Discussion	1,2,3,5 and 7	Ebbing and Gammon Pgs 41-51 Inorganic Chemistry By Catherine Housecroft pg 2-5 Concise inorganic Chemistry pgs 1-3
	Practical 1: Measurements and Density			
Week 4	Atoms, Molecules and Ions <ul style="list-style-type: none"> • Atomic Masses, • Chemical Substances, 	Lecture and Class Discussion	1,2,3,4, 5 and 7	Ebbing and Gammon pg 54-71

	<ul style="list-style-type: none"> Chemical Reactions, Balancing Chemical Equations 	Quiz 1		Inorganic Chemistry By Catherine Housecroft pg 2-5 Concise inorganic Chemistry pgs 1-3
	Practical 2: Atomic Structure- A journey to the Atom			Chemistry Manual
Week 5	Quantum Model of an atom <ul style="list-style-type: none"> The Wave Nature of Light Quantum Effects and Photons The Bohr Theory of the Hydrogen Atom Quantum Mechanics De Broglie Equation- Dual Nature of Matter Heisenberg Uncertainty Principle Wave-Like Property of an Electron Schrödinger Wave Equation 	Lectures and Class Discussion	1,2,3,4	Ebbing and Gammon pg 264 - 270 Inorganic Chemistry By Catherine Housecroft pg 6-9 Concise inorganic Chemistry pgs 4-15
	Practical 3: Formula Writing and Chemical Names			
Week 6	Quantum Model of an Atom <ul style="list-style-type: none"> Quantum Numbers and Atomic Orbitals <ul style="list-style-type: none"> Quantum Numbers and their Properties Relationship between quantum numbers and Electronic configuration 	Lectures and Class Discussion	2,3,4,6,7	Ebbing and Gammon pg 277 - 281 Inorganic Chemistry By Catherine Housecroft pg 9 - 17 Concise inorganic Chemistry pgs 4-15
	Practical 4: Mass Relation in a Chemical Reaction			
Week 7	Mid Semester Exam			
Week 8	Modern Periodic Table <ul style="list-style-type: none"> Electronic Configuration and Periodic Table <ul style="list-style-type: none"> Electron Spin and the Pauli Exclusion Principle Building-Up Principle and the Periodic Table Writing Electron Configurations Orbital Diagrams of Atoms; Hund's Rule 	Lectures and Class Discussion	1,2,3,4,6,7	Ebbing and Gammon pg 294 - 308 Inorganic Chemistry By Catherine Housecroft pg 17 - 24 Concise inorganic Chemistry pgs 25 -32
	Practical 5 : Preparation of a standard solution of 0.1M oxalic acid and standardization of Sodium hydroxide			
Week 9	Periodicity of the Elements <ul style="list-style-type: none"> Some Periodic Properties Periodicity in the Main-Group Elements Shielding Periodic Trend in Effective Nuclear 	Lectures and Class Discussion	1,2,3,4,5,6,7	Ebbing and Gammon pgs 311 - 318 Inorganic Chemistry By Catherine Housecroft pg 24 - 26

	<ul style="list-style-type: none"> Charge Sizes of Atoms and Ions Periodic Trend in Atomic Radii Periodic Trend in Ionic Radii Periodic Trend in the First Ionization Energy Periodic Trend in Electron Affinity Periodic Trend in Electronegativity Common Oxidation State of the Elements 			Concise inorganic Chemistry pgs 33-45
	Practical 6 : Determination of the ethanoic acid content of white vinegar			
Week 10	Atomic Structure and Chemical Bonding <ul style="list-style-type: none"> Lewis Theory <ul style="list-style-type: none"> Lewis Symbols and Lewis Structures Ionic bonding (transfer of electrons) Covalent bonding (sharing of electrons) Lewis Structures and Resonance 	Lectures and Class Discussion	3,4,5,6,7	Ebbing and Gammon pgs 329 - 359 Inorganic Chemistry By Catherine Housecroft pg 31 - 33 Concise inorganic Chemistry pgs 54 - 58
	Practical 7: Acid Base titrations (weak, strong acid and bases)			
Week 11	Molecular Geometry and Bonding Theories <ul style="list-style-type: none"> Valence Shell Electron Pair Repulsion Theory (VSEPR) Covalent Bonding and Orbital Overlap Valence Bond Theory (VBT) Molecular Geometry and Hybrid Orbitals Hybridization Involving d Orbitals Multiple, Bonds and Orbital Overlaps, Resonance Structures and Hybrid Orbitals 	Lectures and Class Discussion Quiz 2	3,4,5,6,7	Ebbing and Gammon pgs 375 - 405 Inorganic Chemistry By Catherine Housecroft pg 32 - 34, 139 - 145 Concise inorganic Chemistry pgs 56-77
	Practical 8: Comparison of the shapes and ions using models			
Week 12	Solutions (Acids and Bases) <ul style="list-style-type: none"> Lewis Definition Ionic Equilibrium in Aqueous Solutions The Strength of the Acids and Bases 	Lecturers, Class Discussion, Practical 8 and	2,3,4,5,6,7	Ebbing and Gammon pgs 624 - 639 Inorganic Chemistry By Catherine Housecroft pg 207 - 218
	Practical's Review			
Week 13	Solutions (Acids and Bases) <ul style="list-style-type: none"> Quantitative Measurement of 	Lectures and Class	2,3,4,5,6,7	Ebbing and Gammon pgs 636-672

	<p>pH</p> <ul style="list-style-type: none"> • The Dissociation of Water • Important Generalization on Acids and Bases • Buffer Solutions • An Equation for Buffer Solutions <p>• Calculating pH Changes in Buffer Solutions</p>	Discussion		Inorganic Chemistry By Catherine Housecroft pg 219 - 223
	Practical Exam			
Week 14	Final Semester Exam			

TEACHING METHODOLOGY:

1. Lectures, using power point presentations and class discussions.
2. Lectures will be given in class to explain to students various topics in basic inorganic chemistry.
3. Lectures will take a participatory approach where the instructor will involve students by frequently asking them questions that are meant to keep them alert and trigger class discussions.
4. **Laboratory learning and Experiments:** The lecturer, together with the laboratory technical staff, will take the students through practical sessions, beginning with **demonstrations**. The students will thereafter be expected to use pre formulated laboratory manuals to carry out various practical exercises then write out their findings in their laboratory workbooks.
5. **Video demonstrations and/or CD-Roms** on Inorganic Chemistry when available, after the relevant topic has been covered.
6. **Assignment criteria:** Students will be given several individual or group research assignments on topics relevant to the course. These could include lectures, discovery learning, problem-based learning, experimental learning, group-based learning, independent studies and e-learning.
7. The instructor will also be free to answer questions from students in the course of the lectures.

COURSE EVALUATION

Class attendance	10%	
Assignments		10%
Practical's	15%	
Practical Exam	10%	
Quizzes		10%
Mid-Semester Exam		20%
Final Exam		25%
Total	100%	

Note: seven absences from class will result to an automatic **grade F**.
Assignments must be handed in on the due dates shown.

REFERENCE BOOKS

Course Text

General Chemistry by Darell Ebbing and Steven Gammon, 9th or 10th Edition.

(ebook)

Other Reference Texts

1. Guha, S. (2013). J.D. Lee Concise Inorganic Chemistry for JEE (Main & Advanced). 2nd Edition. Wiley India Pvt Ltd., Daryaganj, New Delhi, DL
2. Housecroft, C. E., Sharpe, A. G. (2012). Inorganic Chemistry. 4th Edition. Prentice Hall, Upper Saddle River, New Jersey, USA
3. Vogel, A. I., Svehla, G. (2012). Vogel's Qualitative Inorganic Analysis. 7th Edition. Prentice Hall, Upper Saddle River, New Jersey, US

GRADING

A	90-100
A-	87-89
B+	84-86
B	80-83
B-	77-79
C+	74-76
C	70-73
C-	67-69
D+	64-66
D	62-63
D-	60-61
F	0-59