

NORTH SOUTH UNIVERSITY
DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEER
CHE 120: INORGANIC CHEMISTRY
SUMMER 2019



COURSE OUTLINE

1. BASIC INFORMATION

1.1 COURSE DESCRIPTION

Atomic Structure; Periodic Table; Chemical Bonds; Physical and Chemical Properties of Water; Different Types of Solution, Concentration Unit; Chemical Equilibrium and Thermo-chemistry; Reaction Kinetics; Colloid and Colloidal Solution; Chemical Corrosion; Chemical of Environmental Pollution; Polymers Paint and Varnishes.

1.2 COURSE CONTENTS

- Basics of chemistry
- Atomic and molecular structures
- State of matter and solutions
- Chemical reaction, equilibrium and thermochemistry
- Nuclear chemistry and chemistry of elements
- Chemicals of environmental pollution
- Civil engineering and chemistry

1.3 COURSE INFORMATION

1. First year undergraduate course
2. Credit hours: 3 hours of classroom contact and 6 hours of self-study per week.
3. Two classes per week having 1.5 hours of duration
4. Tutorials moderated by teaching assistants
5. The course requires background knowledge of pre-calculus and basic chemistry

1.4 PREREQUISITE COURSES:

1. MAT 116 (Pre-calculus)

1.5 FACULTY

1. Dr. Shama E. Haque; Ph.D., Associate Professor, DCEE; Initial: SEQ
2. Room: SAC 730
3. Office Phone: 02-55668200 ext. 6232
4. Email: shama.haque@northsouth.edu ("CHE 120" in the subject line); Email sent to my personal account and phone calls on my personal cell phone will NOT be replied to.
5. Office Hours: SMTW 8:45 am - 9:30 am; MW 11:20 am - 12:50 pm; or by email appointment

1.6 CLASS HOURS:

Section 1. ST 11:20 AM – 12:50 PM (Room# SAC 207)

1.7 TEXT BOOK:

1. Goldberg, D.E., Fundamentals of Chemistry (2007). 5th Ed, The McGraw-Hill Companies, USA. (GDE)
2. OpenStax College, Chemistry, OpenStax College. 11 March 2015. Rice University, Texas, USA.(OC)
3. Ebbing D.D., Gammon S.D., General Chemistry (2007). 9th Ed. Houghton Mifflin Company, USA. (EG)

2. COURSE OBJECTIVES AND OUTCOMES

2.1 COURSE OBJECTIVE:

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1. To understand the knowledge of inorganic chemistry fundamentals.
2. To develop skill and concepts to solve problems in inorganic chemistry using math, science and chemistry concepts.
3. To understand the central role of chemistry in the context of our society, environment and sustainable development.

2.2 COURSE OUTCOMES (COs):

- CO1: apply knowledge of the fundamental chemical and scientific theories as relevant to inorganic chemistry.
- CO2: ability to use concepts and solve inorganic chemistry problems dealing with chemical bonds and equilibrium, thermo-chemistry, reaction kinetics.
- CO3: discuss the crucial role chemistry plays in our society and environment and utilize this as a basis for understanding safe handling and disposal of chemicals and various environmental issues facing our society.

2.3 MAPPING OF COURSE OUTCOMES TO BSCEE PROGRAM OUTCOMES

L: Slightly maps (low); M: Moderately maps (medium); H: Substantially maps (high)

	PO - 1	PO - 2	PO - 3	PO - 4	PO - 5	PO - 6	PO - 7	PO - 8	PO - 9	PO - 10	PO - 11	PO - 12	PO - 13
CO1	L												
CO2		L											
CO3							L						

2.4 CO DELIVERY AND ASSESSMENT

Sl.	CO Description	Bloom's taxonomy domain/level (C: Cognitive P: Psychomotor A: Affective)	Delivery methods and activities	Assessment tools
CO1	Apply knowledge of the fundamental chemical and scientific theories as relevant to inorganic chemistry.	C1	Lectures, Group Discussions	Quiz/ Midterm Exam
CO2	An ability to use concepts and solve inorganic chemistry problems dealing with chemical bonds and equilibrium, thermo-chemistry, reaction kinetics.	C2	Lectures, Problem Solving; Group Discussions	Quiz/ Midterm Exam
CO3	Discuss the crucial role chemistry plays in our society and environment and utilize this as a basis for understanding safe handling and disposal of chemicals and various environmental issues facing our society.	C2	Lectures, Video, Group Discussions	Quiz/ Final Exam

Cognitive domain (knowledge-based): C

1: Knowledge, 2: Comprehension, 3 Application, 4 Analysis, 5: Synthesis, 6: Evaluation

The affective domain (emotion-based): A

1: Receiving, .2: Responding, 3: Valuing, 4: Organizing, 5: Characterizing

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The psychomotor domain (action-based): P

1: Perception, 2: Set, 3: Guided response, 4: Mechanism, 5: Complex overt response, 6: Adaptation, 7: Origination

3. BSCEE PROGRAM OUTCOMES (PO)

3.1.1. PO – 1: Engineering Knowledge

Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex civil engineering problems.

3.1.2. PO – 2: Problem analysis

Identify, formulate, research the literature and analyze complex civil engineering problems and reach substantiated conclusions using first principles of mathematics, the natural sciences and the engineering sciences.

3.1.3. PO – 3: Design/development of solutions

Design solutions for complex civil engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety as well as cultural, societal and environmental concerns.

3.1.4. PO – 4: Investigation

Conduct investigations of complex problems, considering design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.

3.1.5. PO – 5: Modern tool usage

Create, select and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modeling to complex civil engineering activities with an understanding of the limitations.

3.1.6. PO – 6: The engineer and society

Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional civil engineering practice.

3.1.7. PO – 7: Environment and sustainability

Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of, and need for sustainable development.

3.1.8. PO – 8: Ethics

Apply ethical principles and commit to professional ethics, responsibilities and the norms of the civil engineering practice.

3.1.9. PO – 9: Individual work and teamwork

Function effectively as an individual and as a member or leader of diverse teams as well as in multidisciplinary settings.

3.1.10. PO – 10: Communication

Communicate effectively about complex engineering activities with the engineering community and with society at large. Be able to comprehend and write effective reports, design documentation, make effective presentations and give and receive clear instructions.

3.1.11. PO – 11: Project management and finance

Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work as a member or a leader of a team to manage projects in multidisciplinary environments.

3.1.12. PO – 12: Life-long learning

Recognize the need for and have the preparation and ability to engage in independent, life-long learning in the broadest context of technological change.

3.1.13. PO – 13: Contemporary Issues

Demonstrate sound knowledge on global and local contemporary civil engineering issues.

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4. COURSE ASSESSMENT

4.1 TEACHING/LEARNING STRATEGIES

4.1.1 Lectures

- Attend lectures regularly and punctually
- Pay attention and learn concepts
- Understand concepts that are not precise in the textbook

4.1.2 Tutorials and Group work

- Contact teaching assistant when required
- Come to the tutorial sessions
- Work with peers to solve problems, discuss with friends

4.1.3 Private study

- Review lecture material and textbook

4.2 ASSESSMENT

All exams are written focusing on impartiality of evaluation and fairness. The exams are objective, which require students to select the correct response from several alternatives or to supply a word or short phrase to answer a question or complete a statement. Most of your grade is derived directly from the lectures. Some concepts covered in the lecture are not in the text. The instructor will inform the students of the exam syllabus well ahead of time. To prepare for the exams, the lecture notes should be thoroughly reviewed.

4.3 EVALUATION (TENTATIVE):

Evaluation Policy (Tentative):

Attendance	10%
Midterm Exams (2; one hour)	55%
Final Exam (one hour and 15 minutes)	35%

4.4 GRADING POLICY:

Generally, NSU grading policy will be followed. Minor deviation is still possible depending on the situation.

4.5 EXAM POLICY:

A missed exam will not be rescheduled for any reasons. If due to unavoidable circumstances, a midterm or final exam needs to be rescheduled, prior notice will be given. It is the students' responsibility to regularly check their email/SMS, notice boards (outside the CEE Dept Office) for any changes or announcements.

5. TENTATIVE LECTURE SCHEDULE:

* One Day = 1.5 lecture hours, Total 24 days lecture = 36 lecture hours

Day*	Outcome/ Material Covered	Reference Reading
Day-1	Course overview	-
Day-2	Introduction to Inorganic Chemistry, Contrast with Organic Chemistry; The Relative Importance of Different Elements; Scientific Method – Laws, Hypotheses, and Theories.	Chap-1(OC, EG; GDE)
Day-3	Fundamental Chemistry, Periodic Table, Bohr's Model of the Atom, Relative Energies of Electron, Shells, Subshells, and Orbitals; Electron Configuration of Atoms	Chap-1 and 2 (OC, EG), Chap 4 (GDE)

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Day-4	Classification of Elements; Periodic Properties, Radioactivity, Isotopes	Chap- 2 (OC), Chap- 8 (EG)
Day-5	Early Chemical Discoveries, Fundamental Laws of Chemistry, Significant figures, Accuracy, Precision	Chap-2 (OC; GDE)
Day-6	Types of Formula; The Chemical Equation; Types of Chemical Reactions; Predicting Products of Chemical Reaction, Calculations and Stoichiometry of Chemical Reactions	Chap-1 and 4 (OC) Chap-3 and 4 (EG) Chap-7 and 8 (DGE)
Day-7	Fundamental Chemical Processes; Introduction to Chemical Bonding, Types of Chemical Bonds; Critical Thinking Exercise	Chap-9 (EG), Chap-5 (DGE)
Day-8	MIDTERM EXAM 1 REVIEW	
Day -9	MIDTERM EXAM 1	
Day-10	Chemical Reactions, Reaction Kinetics, The Condition of Equilibrium, Equilibrium Constants, Factors affecting Chemical Reaction Rates	Chap-13 (EG), Chap-18 (DGE)
Day-11	Chemistry of Solution, Solution Stoichiometry, Problems involving Quantities and Limiting Quantities	Chap-11 (OC), Chap-12 (EG), Chap-10 (GDE)
Day-12	Saturated, Unsaturated, and Supersaturated Solutions, Suspension, Colloids	Chap-10 (OC), Chap-15 (GDE)
Day-13	Physical and chemical properties of water	Chap-11 (OC), Chap-12 (EG), Chap-15 (GDE)
Day-14	Chemical Equilibrium, Critical Thinking Exercise	Chap-14 (EG), Chap-18 (GDE)
Day-15	Thermo-Chemistry, Changes of Phase	Chap-5 (OC), Chap-18 (EG), Chapter 14 (GDE)
Day-16	Enthalpy Changes in Chemical Reactions, Critical Thinking Exercise	Chap-5 (OC), Chap-18 (EG), Chap-14 (GDE)
Day-17	MIDTERM EXAM 2 REVIEW	
Day-18	MIDTERM EXAM 2	
Day-19	Chemicals of Environmental Pollution; Radioactivity; half-life	Chap-21 (OC), Chap-20 (EG), Chapter 21 (DGE)
Day-20	Chemicals of Environmental Pollution, Critical Thinking Exercise	Chap-21 (OC), Chap-20 (EG), Handout
Day-21	Chemical Corrosion	Handout
Day-22	Chemistry of Polymer paints and Varnishes	Handout
Day-23	Civil Engineers and Chemistry	Handout
Day-24	FINAL EXAM REVIEW	

6. CODE OF CONDUCT:

It is highly requested that you maintain discipline in the class and not be late, refrain from making noise during lecture, and not leave class early. Turn off cell phone before coming to a class or exams. There are two types of behaviour that are considered academically dishonest. Plagiarism is the deliberate formal presentation or submission of the research, words, ideas, illustrations or diagrams of others as one's own without citation or credit. Cheating is the use of unauthorized aids (including electronic devices), assistance or materials in the preparation of assignments or in examinations. Copying or showing your work to others, or asking for answers is also considered cheating. Penalties for cheating or plagiarism include one or more of the following: a zero grade on an assignment or exam, a failing grade in the course, suspension from the college, and expulsion from the college. On the premises of the University or at a University-sponsored program, students must abide by the Student Code of Conduct: <http://www.northsouth.edu/student-code-of-conduct.html>