



**North South University**  
**Department of Civil and Environmental Engineering (DCEE)**  
**CEE 209: Environmental Chemistry**  
**SUMMER 2019**

## Course Outline

### 1. BASIC INFORMATION

#### 1.1 COURSE DESCRIPTION

A fundamental application of chemical principles to the study of the environment; Key themes are the interaction between life and the environment, air and air pollution, water and water pollution, soil and soil pollution, radioactivity, and how this knowledge is used by the regulatory agencies; A group project focusing on a selected contemporary environmental issues.

#### 1.2 COURSE CONTENTS

- Introduction to environmental chemistry
- Environmental chemist's toolbox
- Atmospheric chemistry
- The chemistry of continental solids
- The chemistry of continental waters
- The chemistry of oceans
- Global change – contemporary issues

#### 1.3 COURSE INFORMATION

1. Second 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 chemistry and environmental science

#### 1.4 PREREQUISITE COURSES:

1. CHE 120 (Inorganic Chemistry) / CHE 101
2. ENV 107 (Introduction to Environmental Sciences).

#### 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 ("CEE 209" 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 09:40 AM - 11:10 AM (Room# SAC 304)  
Section 2. ST 01:00 PM - 02:30 PM (Room #SAC 304)

#### 1.7 TEXT BOOK:

1. J.E. Andrews, P. Brimblecombe, T.D. Jickells, P.S. Liss and B. Reid (2004). An Introduction to Environmental Chemistry. 2<sup>nd</sup> edition, Blackwell Publishing, MA, USA.
2. Manahan, Stanley E. "Environmental science, technology, and chemistry" (2000). Environmental Chemistry, Boca Raton: CRC Press LLC. Boca Raton, USA.

#### 1.8 REFERENCE BOOKS:



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- R.M. Harrison (1999), Understanding Our Environment. An Introduction to Environmental Chemistry and Pollution. 3<sup>rd</sup> Edition, The Royal Society of Chemistry, Cambridge, UK.

**2. COURSE OBJECTIVES AND OUTCOMES**

**2.1 COURSE OBJECTIVE:**

- To understand fundamental knowledge of environmental chemistry.
- To understand and use chemical concepts to analyze chemical processes involved in different environmental problems (air, water, soil).
- To introduce complex environmental chemistry problems, which are stemming from natural and man-made sources and their impact on human health and society at global and national levels

**2.2 COURSE OUTCOMES (COs):**

- 2.2.1 CO1: apply basic knowledge and concepts of the sources, reactions, transport, effects, and fates of chemical species in the Earth's systems and biogeochemical effects of chemicals on the environment
- 2.2.2 CO2: assess chemical processes in different environmental compartments of air, water, land and biota by using the basic understanding of environmental chemistry.
- 2.2.3 CO3: Identify contemporary local, national and global environmental problems by applying the knowledge gained throughout the course.

**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		M											
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 basic knowledge and concepts of the sources, reactions, transport, effects, and fates of chemical species in the Earth's systems and biogeochemical effects of chemicals on the environment	C2	Lectures, Group Discussions, Videos	Quiz/Midterm Exam
CO2	Assess chemical processes in different environmental compartments of air, water, land and biota by using the basic understanding of environmental chemistry.	C3	Lectures, Group Discussions, Videos	Quiz/Midterm Exam
CO3	Identify contemporary local, national and global environmental problems by applying the knowledge gained throughout the course	C2	Lectures, Group Discussions, Videos	Quiz/Final Exam

**2.4.1 Cognitive domain (knowledge-based): C**

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



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- 2.4.2 The affective domain (emotion-based): A  
1: Receiving, 2: Responding, 3: Valuing, 4: Organizing, 5: Characterizing
- 2.4.3 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. In order to prepare for the exams, the lecture notes should be thoroughly reviewed. Hardcopy of presentation reports must be submitted at the beginning of class on time on the prescribed date; electronic versions will NOT be accepted. NO LATE SUBMISSION WILL BE ACCEPTED.

**4.3 EVALUATION (TENTATIVE):**

Lecture	
Attendance	10%
Oral Presentation	10%
2 Midterm Exams (1 hour each)	50%
Final Exam (1 hour 15 minutes)	30%

**4.4 GRADING POLICY:**

NSU grading policy will be followed. However, 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	-



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Day-2	Introduction to environmental chemistry – lessons learnt from environmental science and chemistry	A-1 B-1
Day-3	Introduction to environmental chemistry	A-1; B-2
Day-4	Environmental chemist's toolbox	A-2
Day-5	Environmental chemist's toolbox	A-2
Day-6	The atmosphere	A-3; B-9, 10
Day-7	Atmospheric chemistry	A-3; B-9
Day-8	Midterm Exam Review - 1	
Day-9	Midterm Exam 1	
Day-10	The nature of solid materials of earth's surface	A-4
Day-11	The chemistry of continental solids	A-4; B-5
Day-12	The chemistry of continental solids - Wastes and pollutants in Soil	A-4; B-15
Day-13	Student presentations	
Day-14	Student presentations	
Day-15	The chemistry of continental waters	A-5; B-3, 4
Day-16	The chemistry of continental waters – water pollution, nature and types of water pollutants	A-5; B-3, 4
Day-17	The chemistry of continental waters– case study	A-5; B-6, 7
Day-18	Midterm Exam Review - 2	
Day-19	Midterm Exam 2	
Day-20	The chemistry of oceans	A-6
Day-21	The chemistry of oceans	A-6
Day-22	Global Change	A-7
Day-23	Global change – Case Study	A-7
Day-24	Final Exam Review	
Final Exam (As per schedule declared by NSU)		

**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. To get attendance grade you MUST attend the section you are officially registered in. Turn off cell phone before coming to a class or exams. There are two types of behavior 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>