CHEM 476 **ENVIRONMENTAL CHEMISTRY II** **SP23**

COURSE SYLLABUS

Instructor: Dr. Jeremiah K.N. Mbindyo
Office: Caputo 321
Email: Jmbindyo@millersville.edu

Office hours: M 9-11a.; T 12:10-2:10 p.; W 5-6 p.m.
Other times can be scheduled by arrangement person or by email
Venue: Roddy 153
Class hours: T R 10:50-12:05 p m.

Required materials:

1. **Text**: Environmental Chemistry by Stanley Manahan, 9th Ed.
2. Scientific Calculator. An inexpensive one is sufficient. It should be capable of doing square roots, logarithms (log, ln), and exponentials (10^x, e^x, y^x).
3. Readings assigned in class.
4. **Laboratory notebook**; You will need a permanently bound lab notebook approximately book 7 x 9.5”
5. **Safety glasses**: You will need to have lab goggles for eye protection.

Course textbook: Environmental Chemistry by Environmental Chemistry by Stanley Manahan, 9th Ed. [ISBN13:978-1420059205] **Optional text:** Environmental Chemistry by Colin Baird, 5th edition. [ISBN-13: 978-1429277044]

Course Description: This course is an in depth study of environmental issues from a chemistry perspective. Topics include environmental systems, phase interactions, aquatic chemistry, nutrient cycles, waste minimization, pollution control and remediation, analytical methods in environmental chemistry, environmental policies and regulations, modeling of environmental systems and current topics in environmental chemistry. You will have opportunity to share your experiences and perspectives on environmental issues in class.

Course policies

The course format consists of 2 lectures/discussions a week. You are expected to attend all classes and to contribute actively to discussions. In case of unavoidable absence, you should notify me in advance, preferably in person. It is your responsibility to make up any work missed when you were absent. You should also pick up any hand outs, tests, assignments etc. that were handed out during your absence from my office.

By the end of the course, you should be able to:

(a) Describe the spheres of the environmental chemistry and discuss their interactions
(b) Explain the positive and negative impacts of technology in the environment.
(c) Discuss equilibrium processes in aquatic systems.
(d) Describe nutrient cycles.
(e) Demonstrate an understanding of phase interactions.
(f) Identify sources of water pollution.
(g) Explain the chemical processes in water and waste water treatment.
(h) Provide specific examples of green chemistry and industrial ecology processes.
(i) Explain the role of energy consumption in climate change and discuss alternative sources of green energy.
(j) Describe waste management processes.
(k) Discuss current topics in environmental chemistry such as nanotechnology and bioengineering.

Grade Criteria:
Course grades will be based on hour exams, participation/assignments and final exam. Participation points will be assessed from attendance, contribution to discussions and presentations in class. You are expected to attend lectures and contribute actively to discussions.

Hour Exams		45 %
Final Exam		25 %
Presentations/Participation		10 %
Labs		20 %
Total		100

Grade Distribution

A 90-100	**B** 80-84	**C** 70-74	**D** 60-63
A- 88-89	**B$^-$** 78-79	**C$^-$** 67-69	**D$^-$** 57-59
B+ 85-87	**C$^+$** 75-77	**D$^+$** 64-67	**F** < 57

Tentative order of topics

	Topic	Chapter
1.	Introduction to environmental chemistry, green chemistry and sustainability	1,2
2.	Fundamentals of aquatic chemistry	3
3.	Oxidation-Reduction in aquatic chemistry	4
	Exam 1 - Feb 23	
4.	Phase Interactions – in aquatic chemistry	5
5.	Aquatic microbial chemistry	6
6.	Water treatment	8
7.	Particles in the atmosphere	10
	Exam 2 - March 23	
8.	Industrial ecology and Green chemistry	17
9.	Sustainable energy sources	19
10.	Climate Change	-
11.	Hazardous waste management and remediation	20,21
	Exam 3 – April 20	
12.	Environmental biochemistry	22
13.	Toxicological chemistry	23,24
14.	Analytical methods in environmental chemistry	25-28

Final Exam Tuesday May 2, 8-10 a.m.

Lab Schedule

Week	Date	A	B	C
1	18-Jan	Ksp	H_2O	TiO_2
2	25-Jan	Ksp	H_2O	TiO_2
3	1-Feb	GC	H_2O	TiO_2
4	8-Feb	H_2O	TiO_2	Ksp
5	15-Feb	H_2O	TiO_2	Ksp
6	22-Feb	H_2O	TiO_2	GC
7	1-Mar	TiO_2	Ksp	H_2O
8	8-Mar	SPRING BREAK		
9	16-Mar	TiO_2	Ksp	H_2O
10	22-Mar	TiO_2	GC	H_2O
11	29-Mar	BIOD	HPIC	BIOD
12	5-Apr	BIOD	BIOD	HPIC
13	12-Apr	HPIC	BIOD	BIOD
14	19-Apr	FIELD TRIP		
15	27-Apr	Make up/ check out		

Lab Teams

	1	2
A		
	3	4
B		
	5	
C		

Revised University Class Attendance Policy
The University supports departmental and faculty class attendance policies that are reflective of and consistent with University approved guidelines. Faculty will include their class attendance policy in their syllabi given to all students in their classes at the start of the semester.

University approved guidelines:

1. **Students are expected to attend all classes.** It is the student's responsibility to complete all course requirements even if a class is missed. If a student misses class for an officially excused reason, then he/she is entitled to make up the missed work but only at the convenience of the faculty member. Responsibility for materials presented in, assignments made for, and tests/quizzes given in regularly scheduled classes lies solely with the student.

2. **The University policy is that faculty will excuse absences for the following reasons:**
    a. personal illness,
    b. death or critical illness in the family,
    c. participation in a university-sponsored activity,
    d. jury duty,
    e. military duties, or
    f. religious holidays

3. **Faculty judge the validity of student absences from class within the University's approved guidelines and may require documentation for excused absences.** Faculty will evaluate any reason, other than those listed above, for a student missing class and determine whether the absence is justified. In these circumstances, a student may make up missed work at the discretion of the instructor.

4. **In the case of foreseeable absences, students are encouraged to notify the faculty member in advance.** A student who will miss class due to participation in an official University activity must notify the instructor well in advance of the activity to assure that the absence is excused.

Appeals:

As with any academic issue, students may exercise their right to appeal adverse attendance decisions. Please refer to the current undergraduate catalog for the complete Academic Appeal procedure.

Title IX Statement

Millersville University and its faculty are committed to assuring a safe and productive educational environment for all students. In order to meet this commitment, comply with Title IX of the Education Amendments of 1972, 20 U.S.C. §1681, et seq., and act in accordance with guidance from the Office for Civil Rights, the University requires faculty members to report to the University's Title IX Coordinator incidents of sexual violence shared by students. The only exceptions to the faculty member's reporting obligation are when incidents of sexual violence are communicated by a student during a classroom discussion, in a writing assignment for a class, or as part of a University-approved research project. Faculty members are obligated to report to the person designated in the University Protection of Minors policy incidents of sexual violence or any other abuse of a student who was, or is, a child (a person under 18 years of age) when the abuse allegedly occurred.

Information regarding the reporting of sexual violence, and the resources that are available to victims of sexual violence, is available at http://www.millersville.edu/socialeq/title-ix-sexual-misconduct/index.php.