

CHEM 265.01

QUANTITATIVE ANALYSIS

SPRING 2026

**COURSE SYLLABUS**

**Instructor:** Dr. Jeremiah K.N. Mbindyo  
**Office:** Caputo 321  
**Email:** Jmbindyo@millersville.edu  
**Office hours:** Mon 9-11 a.m.; Wed 9-11 a.m.; Fri 9-10 a.m.  
Other times can be scheduled by arrangement person or by email.  
**Venue:** Roddy 149  
**Class hours:** M W F 8:00 – 9:50 a.m.

**Required materials:**

**Lecture**

1. **Text:** Quantitative Chemical Analysis by Daniel C. Harris 11<sup>th</sup> SBN:9781319490317; ISBN:9781319576899; ISBN:9781319591380 or ISBN:9781319487706
2. **Scientific Calculator.** An inexpensive one is sufficient. It should be capable of doing square roots, logarithms (log, ln), and exponentials ( $10^x$ ,  $e^x$ ,  $y^x$ ).

**Lab**

1. **Lab Manual.** Will be posted in D2L.
2. **Laboratory notebook.** Bound with provision for carbon copy of each page and Perforated for tear out ( available from the bookstore).
3. **Safety goggles** or industrial safety glasses approved by instructor.
4. **Calculator.**
5. **Recommended:** A **flash drive** for data storage.

**Course Description:** This course is an integrated study of advanced chemical equilibrium, activity, experimental uncertainty and accepted practice in the analytical chemistry laboratory. Titrimetry, potentiometry, extraction theory, introductory spectroscopy and chromatography are discussed. By the end of the course, you will be able to:

- (a) Describe and implement the different steps of an analytical process.
- (b) Solve calculations involving concentrations, solutions and stoichiometry and apply them in chemical analysis.
- (c) Demonstrate the proper technique for using common laboratory equipment.
- (d) Identify the sources of experimental error and calculate standard deviations and error from experimental data.
- (e) Perform statistical analysis of data including t, F and Q test.
- (f) Generate calibration curves and perform calculations involving Beer's law.
- (g) Solve chemical equilibrium problems including acid-base and solubility product.
- (h) Demonstrate safe laboratory practices.
- (i) Discuss different techniques for analytical separations.
- (j) Keep a properly documented laboratory notebook.
- (k) Prepare well organized reports using experimental data.

## Course policies

### Course format

The course format consists of three 50 minute lectures/discussions per week. You are expected to attend all classes and to participate and contribute to discussions. In case of a planned unavoidable absence, you should notify me in advance, preferably in person or by email. It is your responsibility to make up any work missed when you were absent. You should also pick up any handouts, tests, assignments etc. that were passed out during your absence from my office during office hours. In the event of unforeseen circumstances, you should email before the end of the class period if possible in order for the absence to be considered excused.

Course grades will be based on in class quizzes, 3 hour exams, laboratory grade and one comprehensive standardized ACS final exam.

### Homework

Homework problems will be assigned in class. Develop the habit of going through class notes after lecture. Do the homework problems then check the solutions to see if your answer is correct. If the answer is incorrect, try to figure out where you went wrong. If you still cannot solve the problem, get some help. Talking to a study partner can greatly help you move towards solving it correctly. Also, take advantage of my office hours or make appointment to come in at any other time convenient to you.

**Peer Learning Hours:** There is free tutoring available by students who have already taken the class. No need to make an appointment simply come work on chemistry with your peers and get help from experienced tutors. Location: Caputo 211.

Day	Time
Tuesday	4:00-6:00 p.m.
Wednesday	4:00-6:00 p.m.
Thursday	4:00-6:00 p.m.

### Exams/Quizzes

Three hour exams will be given during the semester. Exams will be announced at least a week in advance. Lecture quizzes will be announced one or two classes in advance. Be prepared by studying assigned problems.

### Grade Criteria:

Quizzes		25%
Hour Exams		30%
Laboratory		20%
Final		25%

### Grade Distribution

<b>A</b> 90-100	<b>B</b> 80-84	<b>C</b> 70-74	<b>D</b> 60-63
<b>A-</b> 88-89	<b>B-</b> 78-79	<b>C-</b> 68-69	<b>D-</b> 57-59
<b>B+</b> 85-87	<b>C+</b> 75-77	<b>D+</b> 64-67	<b>F</b> < 57

**Note:** You have to score at least 57% or higher in the lecture portion in order to count your lab grade towards your overall course grade.

	<b>Tentative order of topics</b>	<b>Chapter</b>	<b>Exam Dates</b>
1.	Analytical Process and Measurements	Chaps 0, 1, 2, 27	
2.	Experimental Error	3	
3.	Statistics	4	
4.	Quality Assurance and Calibration methods	5	<b>Exam 1– Feb-20</b>
5.	Spectrophotometry and Beer's Law	17, 19, 18-1	
6.	General Chemical Equilibrium	6-1 to 6-4	
7.	Activity and systematic treatment of equilibrium	7	
8.	Monoprotic acid base equilibrium	6-5 to 6-7; 8	<b>Exam 2 – March-27</b>
9.	Polyprotic acid-base equilibrium	9	
10.	Acid-base titrations	10	
11.	Analytical Separations	22, 23, 24.	
12.	Electrodes and Potentiometry	14	<b>Exam 3 – April-24</b>
13.	Fundamentals of Electrochemistry	13	
14.	EDTA titrations	11	
15.	Redox Titrations	15	
16	<b>Final Exam – Wed , May 6- 8-10 a.m. (ACS, Cumulative)</b>		

### **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.

### **Other University Policies**

- Academic Honesty Policy link [Governance Manual \(millersville.edu\)](#); for additional information please see the following: [What is Academic Integrity? | Millersville University](#)
- Attendance Policy link: [Class Attendance Policy | Millersville University](#)
- Inclusion Statement: [Millersville University Inclusion Statement | Millersville University](#)
- Land Acknowledgement: [Land Acknowledgement | Millersville University](#)
- Policy on Delays and Cancellations link [Policy on Delays & Cancellations | Millersville University](#)
- Chosen Name FAQs link [Preferred Name FAQs | Millersville University](#)
- Privacy Rights under FERPA link [Annual Notification of Student Rights Under FERPA | Millersville University](#)
- Student Conduct and Community Standards Handbook link [studentcodeofconduct.pdf \(millersville.edu\)](#)

### **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 and to comply with Title IX of the Education Amendments of 1972 and guidance from the Office for Civil Rights, the University requires faculty members to report incidents of sexual violence shared by students to the University's Title IX Coordinator. 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 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, to the person designated in the University [Protection of Minors policy](#).*

*Information regarding the reporting of sexual violence and the resources that are available to victims of sexual violence is set forth at: [www.millersville.edu/titleix](http://www.millersville.edu/titleix)*