

ANALYTICAL CHEMISTRY (21:160:223)

TENTATIVE SYLLABUS, FALL - 2020

Professor: Dr. Roger A. Lalancette

Email: roger.lalancette@gmail.com

Office location: Olson 010 (in the basement)

Office hours:

Lecture: W 8:30-9:50 & F 10:00-11:20 ONLINE

Required Textbook: "Exploring Chemical Analysis", 5th Edition, by Daniel C. Harris, published by Freeman, NY, 2009. ISBN-13: 978-1-4292-7503-3

Learning Outcomes/Goals:

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

- understand the principles behind quantitative and qualitative analysis of chemical samples.
- know how to design experiments to separate chemical components from mixtures.
- understand the operating principles of analytical instrumentation, including high performance liquid chromatography, UV-visible spectroscopy, atomic absorption spectroscopy, gas-chromatography/ mass spectrometry, and electrochemical devices.
- know how to use equilibrium chemistry to explain titration experiments.

Tentative Grading

Exams*	200 points
Quizzes* 6	50 points
Final Exam (Cumulative)*	<u>150 points</u>
TOTAL	400 POSSIBLE POINTS

* There will be 2 in-class exams (200 points, 50%) offered throughout the semester. Each exam is worth 100 points out of 400 total points. (There will be no make-up exams under any circumstances).

* 6 quizzes will be offered. The best 5 quizzes will be counted, and will count a total of 50 points, which is 12.5% of your total grade. Each quiz will be 10 points. Quizzes missed (up to 1) for any reason will be counted as the dropped quiz (there will be no make-up quizzes under any circumstances).

The quizzes will be from the questions assigned from the textbook as homework after each chapter is completed. All the assignments are done through Blackboard by uploading the files. Late submissions will not be accepted.

Any technical issues (malfunction of laptop, power problems, etc.) will be the student's responsibility.

* The Final exam will be hosted during the final exam period, which will be on Friday **12/20/19???**, from 11:45 AM to 2:45PM. It will be cumulative (from Chapter 0 through Chapter 23). The final exam is mandatory (there will be no make-up exams). The final exam will be worth 150 points, which is 37.5% of the total grade.

Final Grades will be based on the following scale:

- A = 85.0-100
- B+ = 80.0-84.99
- B = 70.0-79.99
- C+ = 65.0-69.99
- C = 55.0-64.99
- D = 50.0-54.99
- F = 0-49.99

Important Dates:

Please find the detailed information by using the following link:

<https://registrar.newark.rutgers.edu/office-registrar-fall-academic-calendar>

9/2/20	1st day of class for Analytical 223
9/1/20 - 9/14/20	Last Day to Add/drop
9/11/20	Last Day to Add only
9/10/20 - 11/2/20	Receive a "W" Grade Read more about "How Dropping and/or Withdrawing From Courses Affects Financial Aid"
11/25/20	Wednesday will follow a Friday Class Schedule
12/10/20	Regular Classes End
12/11/20 –12/14/20	Reading days
Friday 12/20/2020???	Final Exam CHEM 223

Course Policies:

- ACADEMIC INTEGRITY POLICY FOR RUTGERS UNIVERSITY can be found at: <http://academicintegrity.rutgers.edu/academic-integrity-policy/>

Policy on special accommodations:

Rutgers University Newark (RU-N) is committed to the creation of an inclusive and safe learning environment for all students. RU-N has identified the following resources to further the mission of access and support:

- **Students with Disabilities:** Rutgers University welcomes students with disabilities into all of the University's educational programs. The Office of Disability Services (ODS) is responsible for the determination of appropriate accommodations for students who encounter barriers due to disability. In order to receive consideration for reasonable accommodations, a student with a disability must contact ODS, register, have an initial appointment, and provide documentation. Once a student has completed the ODS process (registration, initial appointment, and documentation submitted) and reasonable accommodations are determined to be necessary and appropriate, a Letter of Accommodation (LOA) will be provided to the student. The student must give the LOA to each course instructor, followed by a discussion with the instructor. This should be completed as early in the semester as possible as accommodations are not retroactive. More information can be found at ods.rutgers.edu. Contact ODS: (973) 353-5375 or ods@newark.rutgers.edu.
- **Religious Holiday Policy and Accommodations:** Students are advised to provide timely notification to instructors about necessary absences for religious observances and are responsible for making up the work or exams according to an agreed-upon schedule. The Division of Student Affairs is available to verify absences for religious observance, as needed: (973) 353-5063 or DeanofStudents@newark.rutgers.edu
- **Counseling Services:** Counseling Center Room 101, Blumenthal Hall, (973) 353-5805 or <http://counseling.newark.rutgers.edu/>.
- **Students with Temporary Conditions/Injuries:** Students experiencing a temporary condition or injury that is adversely affecting their ability to fully participate in their courses should submit a request for assistance at: <https://temporaryconditions.rutgers.edu>.
- **Students Who are Pregnant:** The Office of Title IX and ADA Compliance is available to assist students with any concerns or potential accommodations related to pregnancy: (973) 353-1906 or TitleIX@newark.rutgers.edu.
- **Gender or Sex-Based Discrimination or Harassment:** Students experiencing any form of gender or sex-based discrimination or harassment, including sexual assault, sexual harassment, relationship violence, or stalking, should know that help and support are available. To report an incident, contact the Office of Title IX and ADA Compliance: (973) 353-1906 or TitleIX@newark.rutgers.edu. To submit an incident report: tinyurl.com/RUNReportingForm. To speak with a staff member who is confidential and does NOT have a reporting responsibility, contact the Office for Violence Prevention and Victim Assistance: (973) 353-1918 or run.vpva@rutgers.edu.

Learning Resources:

• Rutgers Learning Center (tutoring services) Room 140, Bradley Hall (973) 353-5608
<https://sasn.rutgers.edu/student-support/tutoring-academic-support/learning-center>

• Writing Center (tutoring and writing workshops) Room 126, Conklin Hall (973) 353-5847
nwc@rutgers.edu
<https://sasn.rutgers.edu/student-support/tutoring-academic-support/writing-center>

Responsible behavior and commitment:

1. Absences: Per the University's Course Attendance policy (10.2.7), students are responsible for communicating with their instructors regarding absences. The Division of Student Affairs is available to verify extended absences: (973) 353-5063 or DeanofStudents@newark.rutgers.edu.

2. Regular attendance is the minimum demonstration of responsibility and commitment on your part. Therefore, you are responsible to download handouts when they are posted.

3. In case of internet problems, students will have to email to show their absences (use Blackboard, and not MY email; I **WILL NOT** respond). Attendance to the lectures will be automatically recorded by Blackboard.

4. All students must have a valid Rutgers e-mail account. Class-related information will be sent only to students' Rutgers e-mails. Students are responsible for checking their Rutgers e-mails so that important class-related information will not be missed (via Blackboard).

5. Academic Integrity (The following statement is recommended for inclusion on all syllabi.): As an academic community dedicated to the creation, dissemination, and application of knowledge, Rutgers University is committed to fostering an intellectual and ethical environment based on the principles of academic integrity. Academic integrity is essential to the success of the University's educational and research missions, and violations of academic integrity constitute serious offenses against the entire academic community. The entire Academic Integrity Policy can be found here:
<http://academicintegrity.rutgers.edu/academic-integrity-policy/>

Tentative lecture outline

The exact topics covered on any given day may vary from this schedule.

Week	Date	Chapter(s)	Topic
1	9/2-9/4	0 & 1 & 2	The Analytical Process & Chemical Measurements & Tools of the Trade
2	9/9-9/11	2 & 3	Tools of the Trade & Math Toolkit
3	9/16-9/18*	3	Math Toolkit & *QUIZ 1 (09/18/20)

4	9/23-9/25	4	Math Toolkit & Statistics
5	9/30-10/2*	4 & 5	Statistics & *QUIZ 2 (10/2/20)
	10/7**	5	**EXAM 1 (CH 0 => 4)
6	10/9-10/14		Quality Assurance (QA) & Calibration Methods & Good Titrations & Combustion Analysis
7	10/16-10/21*	6 & 7	Introducing Acids & Bases & Buffers & *QUIZ 3 (10/21/20)
8	10/23-10/28	8 & 9	Acid-Base Titrations
9	10/30-11/4*	10	Polyprotic Acids & Bases & *QUIZ 4 (11/04/20), EXAM 2 (CH 5, CH 6, CH 7, CH 8 & CH 9)
	11/6**-11/11	11 & 14	**EXAM 2 (CH 5 => 10)
10	11/13	15 & 16	Electrode Measurements & Redox Titrations
11	11/18-11/20*		Redox Titrations & Instrumental Methods in Electrochemistry & *QUIZ 5 (11/20/20)
12	11/25-12/2*	17 & 18	Let There be Light & Spectrophotometry & Atomic Spectroscopy & *QUIZ 6 (12/2/20)
	12/4**-12/9	18&19&20	**EXAM 3 (CH 11 => 18)
13		21&22&23	Principles of Chromatography & Mass Spectrometry & Gas & Liquid Chromatography & Chromatographic Methods and Capillary Electrophoresis
14			
	12/20?		Final Exam (CH 0 to CH 23): from 11:45 AM to 2:45 PM

The instructor reserves the right to change the syllabus at any time. All changes will be announced in class and a new syllabus will be electronically available on Blackboard. If you are enrolled in this class past the add/drop day, you are subject to all the rules in this syllabus.

Purposes and Approach of this course

The analytical chemist works to find out how much of a certain analyte is in a sample. How do I find this out, what tools do I use, how can I do this efficiently, how am I assured that the results are both accurate and precise? In this course, you will study some of the important ideas and techniques for both qualitative and quantitative measurements in analytical chemistry. By the end of this semester, you should have an improved understanding of:

- The distinction between quantitative and qualitative measurements.
- Statistical techniques for evaluating and interpreting your data.
- The sources of error in chemical and instrumental analysis.
- Basic concepts of stoichiometry.
- Various titration basics and calculations.
- Interferences in chemical and instrumental analysis.
- Concept of instrument calibration.
- Principles of quantitative and qualitative measurements using optical methods.
- Principles of gas and liquid chromatography.
- Concept of electrochemical methods for quantitative and qualitative measurements.
- Concept of standard addition techniques.

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