

# **LIFE SCIENCE: MOLECULES OF LIFE**

**CORE-UA 310  
FALL 2021**

**Tuesday and Thursday  
3:30 – 4:45 p.m.**



**Professor Trace Jordan  
College Core Curriculum**

**Course email: [molecules310@gmail.com](mailto:molecules310@gmail.com)**

**Office Hour: Thursday, 10:00 – 11:00 a.m. or by appointment**

## **Lab Instructors**

**Carolina Loren Armas      [ca2314@nyu.edu](mailto:ca2314@nyu.edu)**

**Catherine Clinton        [cac929@nyu.edu](mailto:cac929@nyu.edu)**

**Rosemary Neigenfind     [rgn5642@nyu.edu](mailto:rgn5642@nyu.edu)**

## **1. Course Description**

---

*Life Science: Molecules of Life* examines the modern science of biological molecules, which exists at the intersection of chemistry, biology, and medicine. This scientific topic is particularly relevant and important while we are living through the COVID-19 pandemic. We begin by studying the composition of atoms and their electron arrangements. Next, we examine how atoms share electrons to form chemical bonds, which serve as the linkages within molecules. We extend these principles to the chemistry of carbon, the fundamental element of life. Moving to the biological realm, we apply our knowledge of chemistry to study the structure and function of DNA—the molecule of heredity—and how genetic information is used to make proteins with intricate molecular architectures. We also explore how enzymes function as biological catalysts and often serve as the target of pharmaceuticals. The course concludes with a module on the structure and replication of viruses, including influenza, HIV, and the coronavirus that causes COVID-19. The laboratory projects throughout the semester provide an opportunity to deepen your knowledge of course topics using hands-on experiments, data analysis, and computer software.

## **2. Course Objectives**

---

*As a result of this course you will.....*

- Acquire a foundational understanding of the chemistry of life.
- Develop skills in representing and interpreting molecular structures, including visualization of 3D structures.
- Explain connections between the structure and function of biological molecules.
- Develop effective strategies for your own learning and be an engaged participant in our class community of learners.

## **3. Supporting Your Learning in This Course**

---

My primary goal is for this course to be a **valuable and enjoyable learning experience** for you. Please reach out and let me know if there is anything I can do to assist your learning in the course.

We will use a course email for communication:

**molecules310@gmail.com**

I will aim to respond to your message **within 24 hours** during Monday through Friday. You can send emails during the weekend but my timeframe to respond will be longer.

## **4. NYU Brightspace Site**

---

All course materials (textbook chapters, homeworks, additional readings, etc.) will be available through **NYU Brightspace**. The Brightspace site for the lecture (**Section 001**) can be accessed using the **ACADEMICS TAB** on NYU Home.

**Life Science: Molecules of Life, Section 001**

## 5. Course Readings and Materials

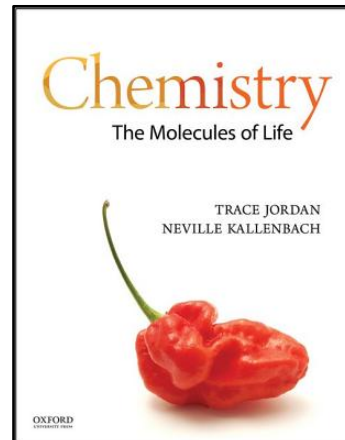
---

### Textbook

Trace Jordan and Neville Kallenbach  
*Chemistry: The Molecules of Life (1<sup>st</sup> Edition)*  
Oxford University Press (2017)  
ISBN: 9780199946174

The relevant chapter for each class is listed in the *Lecture and Laboratory Schedule*, which is provided later in this syllabus. Specific page readings will be announced in the class sessions.

**Please complete the assigned chapter reading BEFORE the corresponding class.**



### ***Follett Access Program***

Our course is participating in the Follett Access program. This is an NYU Bookstore initiative that delivers required course materials at the lowest possible price.

The course textbook will be delivered to you digitally. The **cost of the book is \$45.50**, which will be added as a “book charge” to your bursar bill, this is a savings of \$88.78 over the publisher’s price.

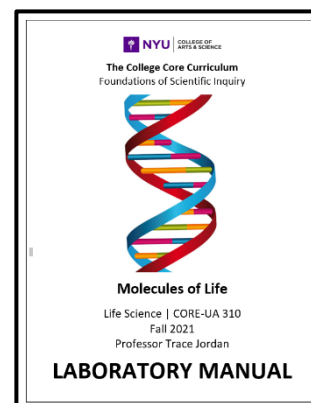
If you decide not to use this digital edition you can opt-out of the program. **The deadline for opting out is September 17th.** If you don’t opt out by this date, you will be charged for the book. The link to opt out of the program is:

<https://includedcp.follett.com/2015>

### **Laboratory Manual**

You will use a custom lab manual that has been designed specifically for this course. For each lab session, please read the **Introduction** to the experiment in the lab manual. Each lab activity will have a **lab quiz** that is based on the introduction in the lab manual.

***Lab Manual for Chemistry: The Molecules of Life***



### **Safety Glasses**

You are required to have **safety glasses** to wear during the laboratory sessions. These safety glasses are available for purchase in the NYU Bookstore. When you go to the bookstore, please request “safety glasses” and **NOT** “safety goggles.”

**SAFETY GLASSES ARE REQUIRED FOR ALL LAB EXPERIMENTS**

If you turn up to lab without your safety glasses, **you will not be permitted to perform the lab experiment and you will not receive course credit for the lab.** We will strictly follow this policy to ensure your safety in the labs

**Additional Materials**

During the semester I will provide **additional readings, websites, and videos** that expand upon the course topics. These materials will be available on the NYU Brightspace site.

**6. Grade Components**

The grade components are listed below. A total of 65% of your course grade will be based on the exams (two midterms and a cumulative final exam). The other 35% will be based on work that you complete throughout the semester (lab projects, homework, weekly quizzes, in-class exercises).

Midterm Exam 1	20 %
Midterm Exam 2	20 %
Final Exam (cumulative)	25 %
Laboratory	20 %
Homework	10 %
Class Exercises	5 %

Course grades are calculated as the **weighted average of all the course components**. The following grading scheme will be used for exams and course grades, unless otherwise announced.

A / A-	B+ / B / B-	C+ / C / C-	D+ / D	F
	B+ 87 – 89 %	C+ 77 – 79 %	D+ 65 – 69 %	F below 60%
A 95 – 100 %	B 83 – 86 %	C 73 – 76 %	D 60 – 64 %	
A- 90 – 94 %	B- 80 – 82 %	C- 70 – 72 %		

**7. Academic Integrity**

**Academic integrity** is the **ethical foundation** of your studies at NYU. By following the principles of academic integrity, you are affirming the value of your own education and your membership in a community of scholars. All students in the course are required to follow the **Academic Integrity policies for CAS courses**. Any violation of these policies is a serious offense that will be reported to the Dean of your school and may result in disciplinary action.

**8. Lecture and Laboratory Schedule**

The lecture and laboratory schedule for the Fall 2021 semester is presented on the next page.

CORE-UA 310 Fall 2021  
Life Science: Molecules of Life

	<b>Date</b>	<b>Topic</b>	<b>Reading</b>	<b>Laboratory Project</b>
1	Th Sept 2	Course Introduction		
		<b>ATOMS AND MOLECULES</b>		
	<i>M Sept 6</i>			<i>No Lab - Labor Day</i>
2	Tu Sept 7	Elements of Life & Death (1)	Ch. 2	
3	Th Sept 9	Elements of Life & Death (2)	Ch. 2	
	<i>M Sept 13</i>			<i>Lab 1: Who Has the Same Substance?</i>
4		Elements of Life & Death (3)	Ch.2	
		<b>CHEMICAL BONDING</b>		
5	Tu Sept 14	Chemical Bonding (1)	Ch. 3	
6	Th Sept 16	Chemical Bonding (2)		
	<i>M Sept 20</i>		Ch. 3	<i>Lab 2: Molecular Structure</i>
7	Tu Sept 21	Chemical Bonding (3)		
		<b>CARBON – THE ELEMENT OF LIFE</b>		
8	Th Sept 23	Carbon – The Element of Life (1)	Ch. 4	
	<i>M Sept 27</i>			<i>Lab 3: Size of a Molecule</i>
9	Tu Sept 28	Carbon – The Element of Life (2)	Ch. 4	
10	Th Sept 30	Carbon – The Element of Life (3)	Ch. 4	
	<i>M Oct 4</i>			<i>Review for Midterm Exam 1</i>
	<b>Tu Oct 5</b>	<b>Midterm Exam 1</b>		
		<b>DNA – MOLECULE OF HEREDITY</b>		
11	Th Oct 7	DNA—Molecule of Heredity (1)	Ch. 12	
	<i>M Oct 11</i>			<i>No Lab – Fall Break</i>
	<i>Tu Oct 12</i>			<i>Lab 4: The Secret of Photo 51</i>
12	Th Oct 14	DNA—Molecule of Heredity (2)	Ch. 12	
	<i>M Oct 18</i>			<i>Lab 5: Extraction of DNA</i>
13	Tu Oct 19	DNA—Molecule of Heredity (3)	Ch. 12	
		<b>FROM DNA TO PROTEINS</b>		
14	Th Oct 21	From DNA to Proteins (1)	Ch. 13	
	<i>M Oct 25</i>			<i>Lab 6: Genetic Mutations (Part 1)</i>
15	Tu Oct 26	From DNA to Proteins (2)	Ch. 13	
16	Th Oct 28	From DNA to Proteins (3)		
	<i>M Nov 1</i>			<i>Lab 7: Genetic Mutations (Part 2)</i>
17	Tu Nov 2	From DNA to Proteins (4)		
		<b>ENZYMES</b>		
18	Th Nov 4	Enzymes as Biological Catalysts (1)	Ch. 14	
	<i>M Nov 8</i>			<i>Lab 8: Enzyme Activity of Catalase</i>
19	Tu Nov 9	Enzymes as Biological Catalysts (2)	Ch. 14	
20	Th Nov 11	Enzymes as Biological Catalysts (3)		
	<i>M Nov 15</i>			<i>Review for Midterm Exam 2</i>
	<b>Tu Nov 16</b>	<b>Midterm Exam 2</b>		
		<b>VIRUSES</b>		
21	Th Nov 18	What Are Viruses?	TBA	
	<i>M Nov 22</i>			<i>Lab 9: The 1918 Influenza Pandemic</i>
22	Tu Nov 23	HIV: Structure & Replication	TBA	
	<i>Th Nov 25</i>	<i>No Class - Thanksgiving</i>	TBA	
	<i>M Nov 29</i>			<i>Lab 10: ELISA Antibody Test</i>
23	Tu Nov 30	HIV: Drug Design	TBA	
24	Th Dec 2	Coronavirus : Structure & Replication	TBA	
	<i>M Dec 6</i>			<i>Lab 11: Coronavirus Genomes</i>
25	Tu Dec 7	Coronavirus: Vaccines and Drugs	TBA	
26	Th Dec 9	Coronavirus: What's Next?	TBA	
	<i>M Dec 13</i>			<i>Review for Final Exam</i>
27	Tu Dec 14	Course Review		
	<b>Th Dec 16</b>	<b>Final Exam (4:00 – 5:50 p.m.)</b>		

## 9. Laboratory Activities

---

**You must be registered in a laboratory section** in order to receive credit for the course. The sections have a capacity of **20 students**. The section enrollment cannot be increased due to safety issues and the availability of laboratory equipment. If you are not appropriately registered for a laboratory section by Lab #2, you will need to **drop the course**.

The laboratory sessions will be held in **Silver 201** and will begin on **Monday, September 13**. There are **no lab sessions during the first full week of classes** because of the Labor Day holiday.

Lab Section	Day and Time	Lab Instructor
002	Monday 9:30 a.m. – 10:45 a.m.	Catherine Clinton
003	Monday 11:00 a.m. – 12:15 p.m.	Catherine Clinton
004	Monday 12:30 p.m. – 1:45 p.m.	Rosemary Neigenfind
005	Monday 2:00 p.m. – 3:15 p.m.	Rosemary Neigenfind
006	Monday 3:30 p.m. – 4:45 p.m.	Carolina Armas
007	Monday 4:55 p.m. – 6:10 p.m.	Carolina Armas

The laboratory exercises have been designed to expand upon topics in the lectures and to provide you with the opportunity to become skilled at scientific observation, data interpretation, and the use of computer-based tools. Each lab activity is worth **50 points** with the following breakdown:

### **Attendance Credit (5 points)**

You are expected to **arrive punctually** for the beginning of the lab session. Arriving more than **10 minutes late** will result in a loss of attendance credit for the session.

### **Laboratory Quiz (10 points)**

The laboratory quiz will be administered **BEFORE** the beginning of each lab activity. Lab quizzes will be released on the NYU Brightspace site for the **lecture section** (001) of the course. Each online lab quiz has a **time limit of 10 minutes**. The final **submission time** for the lab quiz is **11:55 p.m.** on the **day before** the lab activity (i.e., you should **begin** your lab quiz no later than 11:45 p.m.).

### **Laboratory Assignment (30 points)**

The lab assignment should be completed and submitted **during the laboratory period** by working collaboratively with your laboratory partner. Some lab activities may have a **take-home component** that you will complete after the lab and submit at a later date.

### **Clean-Up (5 points)**

After completing the lab activity, you are expected to clean and tidy your lab bench, plus dispose of all chemical waste and used supplies. Clean-up instructions are provided in your lab manual and at the direction of your lab instructor. **Failure to clean up properly will result in a 5-point loss of credit for the lab.**

## **10. Laboratory Attendance Policy**

---

The laboratory activities are essential as an essential component of this course. By performing experiments, analyzing data, and using scientific software, you gain a **deeper understanding** of scientific inquiry. For this reason, **you are required to attend all lab sessions** during the semester and **arrive on time** according to the lab schedule.

However, I understand that it may not be possible to attend a lab section for reasons such as illness, observation of a religious holiday, or a family emergency. In these cases, you can request an **excused absence** by completing an **online absence form**. I have provided a Google Form on the NYU Brightspace site for this course. The lab absence form must be completed **within one week** of the missed lab session. Excused absences **will not count** towards your lab grade for the course.

If you miss a lab because of illness, you are **NOT** required to provide any details about your illness and you are also **NOT** required to provide a doctor's note. During these unusual times, the most important goal is to feel better as soon as you can!

## **11. Study Questions**

---

**Study questions** will be posted after each class on the NYU Brightspace site. These questions are designed to help you focus on the most important concepts and skills in the course. I recommend that you write/draw answers to the study questions **after each class** or **at least once per week**. This study routine will help you **retain and recall** the course content,

## **12. Homework**

---

You will be assigned regular homework during the semester. The homework assignments are aligned with the textbook chapters and provide practice with foundational knowledge, concepts, and skills in the course. Some homework assignments may ask you to analyze scientific information in media reports or other sources.

I encourage you to submit **each homework by the due date** in order to keep on track with your work for the course. If you find that you cannot meet the due date because of special circumstances, each homework will have a **48-hour no-penalty extension**.

## **13. Class Exercises**

---

Class exercises will be given regularly throughout the semester to help you develop your knowledge and skills. For some assignments you will work **individually**, and for others you will work in a **group**. Full credit is given for your **best effort** at answering the assigned questions. All class exercises are designed to be completed **during the class in which they are given**.

If you miss a class and are not able to complete the class exercise, you are permitted a **maximum of three make-up exercises** during the semester. The make-up exercises will be posted on the NYU Brightspace site for the course. All make-up exercises must be submitted within **ONE WEEK** of the original date for the class exercise.

Make-up exercises can be **submitted during class** or **delivered to my mailbox** in **Silver 903** between 10:00 a.m. and 3:00 p.m. If you are unable to deliver the class exercise because of illness, please send an attachment of the make-up exercise to the course email: **molecules310@gmail.com**

## **14. Exam Format and Policies**

---

The exams will contain questions taken from the **classes, readings, and laboratory projects**. The questions will have several different formats—multiple choice, short answer, molecular drawings, and applying your knowledge to new examples. The final exam is **cumulative** and will draw on topics from throughout the entire course.

**Study questions** for the lecture topics and lab projects provide a useful guide for learning the course content. **Homework assignments** provide valuable practice with topics that will appear on the exams.

If you will miss one midterm exam because of illness, you must contact Professor Jordan by e-mail **before the start of the exam**. **No make-up exams** will be given for this course. Instead, the final exam will count as **45% of your course total**. Since the final is cumulative, this option is not advisable unless extreme circumstances prevail. If you miss **both** midterm exams, then you must withdraw from the course.

A make-up will be given for the final exam only under **exceptional circumstances** that must be discussed with Professor Jordan prior to the exam. In the rare cases where approval is granted, a grade of **incomplete** will be given for the course and the make-up will be scheduled for the Spring 2022 semester.

## **15. Use of Electronic Devices During Class Periods**

---

Computers have become a valuable tool for learning, and many of you may use a laptop or tablet during class to read the posted notes and/or write your own notes. Using these devices in class for the purpose of helping you learn is completely appropriate.

By contrast, **inappropriate use** of electronic devices during class has a **negative effect** on your focus and learning. In addition, it **distracts other students** around you. This behavior goes against one of the learning goals for the course, which is to “be an engaged participant in our class community of learners.”

There, I encourage you to **limit your use of technology during class** to applications that are **directly related** to your learning in the course. There is strong evidence from the educational resource literature that focusing your use of technology on class content helps you learn better and creates a positive environment in the class.

## **16. Religious Holidays**

---

University policy allows students to observe a religious holiday without any academic penalty. If you miss a lecture because of a religious holiday, please make sure to catch up with the reading and class presentation. The best strategy is to obtain the class notes from another student in the course. In addition, I am available during office hours to discuss any course content that you miss.

If you miss a lab because of a religious holiday, **please notify your lab instructor and complete a lab absence form**. We will not count the missed lab as part of your lab grade.



## 17. NYU Resources

---

At some point in the semester you may need some help for an academic, health, or wellness issue. NYU provides excellent support resources and I encourage you to use them. *Educational research reveals that college students who take advantage of academic and/or wellness resources are more likely to be successful in their courses!*

### University Learning Center [www.nyu.edu/ulc](http://www.nyu.edu/ulc)

The University Learning Center provides free tutoring services and workshops on general study skills. Visit the website for the schedule of tutoring and workshops.

### NYU Wellness Exchange [www.nyu.edu/life/safety-health-wellness/wellness-exchange.html](http://www.nyu.edu/life/safety-health-wellness/wellness-exchange.html)

The NYU Wellness Exchange provides an access portal for the university's health resources, including mental health services.

### Writing Center [cas.nyu.edu/content/nun-as/cas/ewp/writing-center.html](http://cas.nyu.edu/content/nun-as/cas/ewp/writing-center.html)

The Writing Center provides individualized assistance to help you develop your skills as an effective writer.

### Moses Center for Student Accessibility <https://www.nyu.edu/students/communities-and-groups/student-accessibility.html>

New York University is committed to providing equal educational opportunity and participation for all students. The Moses Center for Student Accessibility (CSA) works with NYU students to determine and implement appropriate and accommodations to support equal access to a world-class education.

If you require accommodations for any component of this course, please contact the Moses Center to make these arrangements. Please note that the Moses Center will have reduced seating capacity for exams due to COVID-19 safety protocols. If you plan to take the course exams at the Moses Center, **please reserve your space as soon as possible.**