RUTGERS
School of Arts and Sciences

# General Chemistry II (01:160:162) Fall 2022

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| **Course Name and Number**<br>Course site (or other course management system) | 01:160:162<br>Canvas https://canvas.rutgers.edu |
| **Semester**<br>**Meeting Days, Times, and Place(s)** | Fall Semester 2022<br><br>Sections 01-05 T and Th 7.30 pm – 8.50 pm (LO2 022, C/D Campus)<br>Sections 11-15 T and Th 7.30 pm – 8.50 pm (TIL 232 Liv Campus)<br>Recitations: students are assigned to one in person recitation per week , please refer to the schedule provided online) |
| **Instructor's Name**<br>**Contact Information:**<br>e-mail/telephone | Prof. Darrin York : Course Coordinator<br>Email : york@chem.rutgers.edu<br><br>Lipika Roychowdhury : Lecturer and Course Administrator<br>Email: lipikar@chem.rutgers.edu<br><br>Tatiana Fadeeva; Lecturer<br>Email: fadeeva@chem.rutgers.edu |
| **Learning Goals** | |
| Core Curriculum Learning Goals Met by this Course<br>  | • Understand and apply basic principles and concepts in the physical or biological sciences.<br>• Explain and be able to assess the relationship among assumptions, method, evidence, arguments, and theory in scientific analysis. |

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| **<u>Department Learning Goals Met by this Course</u>**<br>**Chem 162** | *By the end of this course (CHEM 162), students will be able to draw upon:*<br><br>• relevant scientific models<br>• representations at the macroscopic, submicroscopic (small particle), and symbolic levels—including mathematical formulae<br>• qualitative and quantitative reasoning skills<br><br>*…to demonstrate their understanding that:*<br><br>1. "**Structure and Function:** Chemical compounds have geometric structures that influence their chemical and physical behaviors."<br>2. "**Chemical Reactions:** Matter changes, forming products that have new chemical and physical properties."<br>3. "**Thermodynamics**: Energy is the key currency of chemical reactions in molecular-scale systems as well as macroscopic systems."<br>4. "**Measurement and Data**: Chemistry is generally advanced via experimental observations."<br>5. "**Kinetics:** Chemical changes have a time scale over which they occur."<br>6. "**Equilibrium:** All chemical changes are, in principle, reversible; chemical processes often reach a state of dynamic equilibrium."<br>7. "**Visualization**: Chemistry constructs meaning interchangeably at the particulate and macroscopic levels." |
| **Common hour exam dates** | **Exam I : October 06, Thursday : Time 9.20-10.40 pm**<br>**Exam II: November 03, Thursday :Time 9.20-10.40 pm**<br>**Exam III : December 06 Tuesday : Time 9.20-10.40 pm**<br>**Final Exam: TBA** |
| **List of Required Books &/or Materials** | 1. "CHEMISTRY. Structure and Properties" NIVALDO J. TRO 2nd Ed<br>2. The textbook for this course is Rutgers custom edition, available in the bookstore, together with the student's solutions manual. Scientific calculator |

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| **Current Academic Integrity Policy (at instructor/admin's discretion)**: http://academicintegrity.rutgers.edu/academic-integrity-policy/<br><br>Violations include: cheating, fabrication, plagiarism, denying others access to information or material, and facilitating violations of academic integrity.<br><br>*Optional: Instructors may include a Honor Pledge:*<br>"On my honor, I pledge that I have neither given nor received any unauthorized aid on this (exam, test, paper)." | *General Academic Integrity Link:*<br>*http://academicintegrity.rutgers.edu/*<br><br>*Resources for instructors can be found at:*<br>http://academicintegrity.rutgers.edu/resources-for-instructors/ |
| **Attendance policy** | Attendance may be monitored electronically during lectures and recitations. |
| **Course Structure and Requirements Assignments to be graded including due dates and grade distribution/percent value of each assignment.** | *University attendance and religious holiday policies are at* http://catalogs.rutgers.edu/generated/nb-ug_current/pg1354.html<br><br>*An interfaith calendar can be found at*<br>*http://www.interfaithcalendar.org/index.htm* |
| **ODS accommodation policy** | • Students with disabilities requesting accommodations must follow the procedures outlined at https://ods.rutgers.edu/students/registration-form. |

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| **Final Exam/ Date and Time**<br>http://finalexams.rutgers.edu/ | **You can use this link to check the final exam schedule.**<br><br>*http://www.sas.rutgers.edu/cms/sasoue/policies-resources/policies/15-policies-resources/policies/65-final-exams* |

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| **Disability Services**<br>**(848) 445-6800 / Lucy Stone Hall, Suite A145, Livingston Campus, 54 Joyce Kilmer Avenue, Piscataway, NJ 08854 / https://ods.rutgers.edu/**<br>Rutgers University welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student with a disability must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation: https://ods.rutgers.edu/students/documentation-guidelines. If the documentation supports your request for reasonable accommodations, your campus's disability services office will provide you with a Letter of Accommodations. Please share this letter with your instructors and discuss the accommodations with them as early in your courses as possible. To begin this process, please complete the Registration form on the ODS web site at: https://ods.rutgers.edu/students/registration-form.<br><br>**Assessment of Students**<br>An integrated approach to assessing the achievement of the learning goals 1 and 2 will be used. This includes the use of a mixture of written quizzes, multiple choice exam questions, among others aimed specifically at each of these learning goals. | |

**General Chem. 162** **Fall 2022** **Lectures: TTh 7:30 – 8:50 PM**

All readings and assignments are in "*Chemistry: Structure and Properties*" (2nd Edition) by Nivaldo J. Tro,

Exact pace of topics and associated problems subject to change, as determined by the pace in lecture.

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| 1 | T Sep 06 | Types of solutions. Concentrations. Henry's Law. | 13.1-13.4 | Ch 13: 25,27,29,31,33,35,37,39,41,43,45, 47,53,55,57,59,61,63,95 |
| 2 | Th Sep 08 | Electrolytes, Colligative properties, colloids. | 13.4-13.6 | Ch 13: 67,69,71,73,75,77,79,81, 101,105,109,117 |
| 3 | T Sept 13 | Kinetics. Collision Theory. | 13.7<br>14.1-14.3 | Ch 13: 83,85,87,89,91,93<br>Ch 14: 27,29,33,35 |
| 4 | Th Sept 15 | Rate Law expressions. Integrated Rate Laws. | 14.4-14.5 | Ch 14: 39,41,43,45,47,49,51,53,55,57, 85,89,91,109 |
| 5 | T Sept 20 | Activation energy.<br>Temperature dependence of rate | 14.6 | Ch 14: 59,61,63,69,71,111 |
| 6 | Th Sept 22 | Reaction Mechanisms, Catalysis. | 14.7-14.8 | Ch 14: 75,76,77,78,81,82,95,96,101 |
| 7 | T Sept 27 | Equilibrium: Principles, Calculations & Problems | 15.1-15.6 | Ch 15: 21,23,25,27,29,33,37,39,41,43 |
| 8 | Th Sept 29 | Equilibrium approximations | 15.6-15.8 | Ch 15: 47,49,53,55,59,61,63,65,67,69,71, 75,81,93 |
| 9 | T Oct 04 | Le Chatelier's Principle<br>Acid & Bases: (Brønsted vs Lewis) Acid Strength, and Molecular Structure, | 15.9<br>16.1-16.3 | Ch 16: 31,33,35,37,39,41,43,49,51,53, 55,57,59 |
| | **Th Oct 6*** | **EXAM I (lectures 1-8)**<br>**Review in Lecture** | | **Time : 9.20 pm -10.40 pm**<br>**Location : TBA** |
| 10 | T Oct 11 | Acid Strength, and Molecular Structure,<br>Strong and weak Acids and Bases | | Ch 16: 31,33,35,37,39,41,43,49,51,53, 55,57,59 |
| 11 | Th Oct 13 | Ka, Kb scale. pH calculations. | 16.3-16.6 | Ch 16: 61,63,65,67,69,71,73,75,77,79, 81,83,85,87,89,91,93,95,125,133 |
| 12 | T Oct 18 | Polyprotic acids, Ions as acids and bases. pH of saltsolutions. | 16.7-16.8 | Ch 16: 97,99,101,103,105,107,109,111,113, 115, 117, 119, 143 |
| 13 | Th Oct 20 | Ions as acids and bases. pH of salt solutions. | 16.9-16.10 | Ch 16: 121,123 |
| 14 | T Oct 25 | Lewis Acids/Bases & Buffers | 16.11, 17.2 | Ch 17: 59,61,63,65,67,69,71,73,75, 79,81,119,121 |
| 15 | Th Oct 27 | Buffer effectiveness & titrations | 17.3-17.4 | Ch 17: 25,27,29,31,33,35,37,39,41,43, 45,47,49,51,53,55 |
| 16 | T Nov 01 | Indicators, titratrions,<br>Ksp and solubility. Common ion effect | 17.4-17.5 | Ch 17: 83,85,87,89,91,93,95,97, |
| | **Th Nov 03*** | **EXAM II (LECTURES 9-15)**<br>**Review in Lecture** | | **Time : 9.20 pm -10.40 pm**<br>**Location : TBA** |
| 17 | T Nov 08 | Selective precipitation. Complex Ion Equilibria<br>Spontaneous and nonspontaneous processes, | 17.6-17.7<br>18.1-18.3 | Ch 17: 107, 108 |
| 18 | Th Nov 10 | Second law of Thermodynamics, Predicting Entropy Changes & Gibbs Free Energy | 18.4-18.7 | Ch 18: 57,59,61,63,65,67,69,83 |
| 19 | T Nov 15 | Free energy changes in chemical reactions, Free energy change and equilibrium, Balancing redox equations.. | 18.8-18.10<br>19.1-19.2 | Ch 18: 71,75<br>Ch 19: 33,35,37,39,41,43,45,99,119 |
| 20 | Th Nov 17 | Voltaic cells, standard potentials,<br>Free energy & Equilibrium constant | 19.3-19.5 | Ch 19: 47,49,51,53,55,57,59,61,63,65, 67,113 |
| 21 | T Nov 22 | Nernst Equation Concentration cells.: Batteries, Corrosion | 19.6-19.7 | Ch 19: 69,71,73,75,77,105, 85,87,89,91,93,95,97,117,121 |
| 22 | T Nov 29 | Electrolysis & Corrosion<br>Nature of the nucleus. Valley of stability<br>Kinetics of radioactive decay | 19.8-19.9<br>20.1-20.6 | Ch 19: 69,71,73,75,77,105, 85,87,89,91,93,95,97,117,121<br>Ch 20: 31,33,35,37,39,41,43,45,47,49, 51,53,55,83,91 |
| 23 | Th Dec 01 | Nuclear binding energy. Types of radioactive decay. | 20.7-20.8<br>20.11-20.12 | Ch 20: 57,59,61,63,64,65,67,69,71,73, 75,85,109 |
| | **T Dec 06*** | **EXAM III (LECTURES 16-22)**<br>**Review in Lecture** | | **Time : 9.20 pm -10.40 pm**<br>**Location : TBA** |
| 24 | Th Dec 08 | Coordination chemistry: Complex ions, nomenclature, and different forms of isomerism | 22.3-22.4 | Ch 22: 21,23,25,27,29,31,33,35,37,39 40,61 |
| 25 | T Dec 13 | Catchup and Review | | |
| | | **Final Exam ( Comprehensive)** | | **Date , time and location : TBA** |

*Exam dates may need to be rescheduled. Chapter sections covered in each exam subject to change.

**General Chemistry II (01:160:162) Fall 2022**

Welcome to CHM 162. Chemistry 162 is the second semester of the general chemistry course. This handout provides information concerning course policies and procedures. You are responsible for all the information in this handout. A syllabus is provided separately.

**Lectures:** TTh 7:30 - 8:50 PM, LOR 022 (C/D) ( Sections 01-05)
TTh 7:30 - 8:50 PM, TIL 232 (Livi) (Sections 11-15)

**Lecturers : Lipika Roychowdhury** lipikar@chem.rutgers.edu
**Tatiana Fadeeva** fadeeva@chem.rutgers.edu

You must attend the lecture to which you are assigned . Attendance is of utmost importance since the lecturers will be emphasizing and clarifying important and difficult concepts. You are responsible for what transpires in lecture, including any announcements and changes to the syllabus. You are also responsible for all the assigned readings and problems, whether or not they are explicitly discussed in class. The material must be read **before** as well as after any given lecture. The syllabus is an approximation. The actual pace of the class will have to be determined by the abilities of the class itself. Some days, we will be ahead of the syllabus; some days we may be behind.

**Any changes in the course format and/or information about exams and quizzes will be announced in lecture. Take notes! Do not rely on Canvas only and attend classes in a timely manner.**

## RECITATION

**You are also assigned one 55 minute in-person recitation per week. Please the schedule of courses for the section number, day, time and location. Recitations will begin the week of Sep 12.**

**We expect you to be present and engaged at all scheduled class times.**

**OFFICE HOURS:** Remote (TBA). Will be posted on Canvas. You are welcome to attend any of the office hours that fit your schedule regardless of your recitation section or instructor. All instructors work as a team.

## REQUIRED MATERIALS:

1. Chemistry ;Structure and Properties, 2nd Ed, by Nivaldo J. Tro. Lecture material and suggested practice problems originate in this textbook.
2. You have the option to use the Rutgers Custom Edition of "Chemistry: Structure and Properties", Second Edition, by Nivaldo Tro available at the Rutgers Bookstore. The textbook is available online as an e-book at :

https://www.vitalsource.com/products/chemistry-nivaldo-j-tro-v9780134551326

Please also check the First Day Course Material on the home page on Canvas.

3. Scientific calculator (logarithms, exponentials, powers, roots, etc.). This does not have to be an expensive calculator. **Expensive, programmable calculators (graphing calculators) are <u>not allowed in this course and</u>** are considered a violation of academic integrity if used.

## CLASSROOM MANAGEMENT SYSTEM (Canvas)

We will be using canvas this fall (URL: http://canvas.rutgers.edu/) as a classroom management system. You should check this site regularly. However, this site is not a substitution for you not attending lectures or recitation. If you check it now, you may find a number of documents posted. If you are registered and a Rutgers Student, you will automatically be a "member" of the class. You will need your NetID to login. You should read the documents, especially the Syllabus, Grading Policies, the Announcements and other material very carefully. During the course many additional documents will be posted on the web site including practice exams, and useful information or explanations about important topics.

You can email tech support at help@canvas.rutgers.edu or phone them at 877 361 1134 if you need any help navigating through the system.

## ONLINE QUIZZES

Online quizzes will be assigned every week through the website https://my.elearning.rutgers.edu.

Every week, students will be able to access a practice assignment that will not be graded and available until the end of the semester.

Another type of assignment,(quizzes) timed and graded, will also be released every week which will be released on a particular date and will need to be completed by a due date, The quizzes will be approximately of 30 minutes duration. More information will be provided during lecture.

**It is imperative that students make sure their computer systems and internet connections are dependable so that no technical issues arise during the quiz taking sessions**. Tech support will be on hand to ensure that every student has the best possible experience and will gladly work with students to make sure that their computer system will allow them from attending/fully participating in sessions. **However, it is ultimately your responsibility to ensure that the computer and/or internet connection used for lecture or during quiz taking are reliable.**

There is no makeup for missed quizzes. Two of the lowest quiz grades will be dropped. Your missed quiz will be counted as the lowest quiz grade.

## EXAMS

There will be three 80-minute exams plus a 120-180 minute final exam. The exams will be offered on paper and in person.

- **Exam I*: Thursday, October 06, 2022. Time : 9.20pm -10.40 pm**
- **Exam II*: Thursday, November 03, 2022 . Time :** 9.20**pm** -10.4**0 pm**
- **Exam III*: Tuesday, December 06, 2022 . Time :** 9.20**pm** -10.4**0 pm**
- **Final Exam (comprehensive): Date and Time : TBA**

**The exam locations will be announced at a later date.**

*** The chapter sections that will be covered for each exam is subject to change as the course progresses along. Please check the canvas site and pay attention to announcements in class. Please also note that the exam dates are subject to change.**

## EXAM RULES AND MISSED EXAM

**Exam Conflict:** Certain scheduled Rutgers activities may take precedence over class activities for students who are formally registered to participate in those activities (see also RU Common Hour Exam Policies). If a student has a conflict between an examination and a scheduled activity, or if a student has a final exam conflict, he/she **MUST notify the course Administrator, by email by the end of second week of classes of such conflict(s).** Please, see RU Final Exam Policies Rule#4 for what constitutes a final exam conflict.

An exam conflict will be treated as if the student has missed the exam with a legitimate reason (see below). A student with final exam conflict will be allowed to take a make-up final. The exact date and location will be announced later. **There will be no make-up for the Make-Up Final.**

**Missed Exam**: **There are no makeup mid-term exams.** Exams must be taken at the scheduled times. Only excusable reasons will be considered (illness or emergency in the family). **To be excused from an exam,** you must fill out a self-reported absence form, available at https://sims.rutgers.edu/ssra ***and*** you must provide a letter of excuse **within 3 days of the exam** from the Dean of Students Office (deanofstudents@echo.rutgers.edu). Unexcused missed exams will result in a score of zero (0) for that exam. For excused exams, the score will be temporarily assigned as zero (0) and will be replaced by the average of the other two exams .

If two mid term exams are missed, due to an excused absence, a makeup exam will be provided for one of the missed exams.

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**To request permission to take a conflict final exam, please e mail lecturer/administrator at lipikar@chem.rutgers.edu as soon as you can but not later than November 30. Be sure to include the following documentation:**

1. **A copy of your course schedule as sent to you by the university.**
2. **Supporting documents to verify that a conflict exists.**

**GRADES**

**No grades are assigned per exam/quiz. The final grade will be determined based on the total percentage points accumulated by the individual in comparison to the total percentage points accumulated by the rest of the class. As a guideline, average on a midterm is a C/C+. Recitation attendance, lecture participation via online tools will be considered when assigning grades to borderline students. Exam scores will be posted on canvas under grades.**

The course grade (A, B+, B, C+, C, D, F) will be based on the total number of points that a student accumulates at the end of the semester. The maximum score is expected to be about **650 points** distributed **roughly** as follows:

| | Points | % |
|---|---|---|
| Exam 1 | 100 | TBD |
| Exam 2 | 100 | TBD |
| Exam 3 | 100 | TBD |
| Final Exam | 200 – 210 | TBD |
| Online Quizzes | 100 | TBD |
| Recitation Quizzes | 50 | TBD |
| Total | Approx. 650 | 100 |

**A grade of < 35% on the final exam will result in an automatic F for a final grade.**
Please understand that there is no extra credit in this class. It is unfair to the rest of the students. Please do not ask if you can do extra work to improve your grade. You are graded on your **performance** in the course. For obvious reasons, you will not be graded on how hard you worked, or other factors such as personal reasons, financial issues, losing a scholarship, inability to apply for a specific program, not making the Dean's list, non-payment for your course, being a senior, being offered a job, your family situations, the impact on your GPA, a course requirement, transfer of the course to another school, your work requirements, the potential of you getting suspended etc… For the same reasons that we cannot arbitrarily give you a better grade, we cannot do the reverse, we cannot change a D to an F.

The final percent ranges will not be discussed. We will not discuss the grades and performance of other students with you.

**STUDENTS WITH SPECIAL NEEDS (Please provide letter by the end of the second week of the course)**

Any student requiring extra time and/or other unusual testing accommodations must provide documentation supporting their circumstances and **MUST notify the course Administrator.** Please do this during the first two weeks of classes or immediately after these needs are documented. ALL requests for extend time and/or other special accommodations for exams must be handled through the Office of Disability Services (http://disabilityservices.rutgers.edu/). The office of Disability Services will be responsible for all necessary proctoring arrangements.

**ACADEMIC INTREGRITY AT RUTGERS**

Students are expected to maintain the highest level of academic integrity. We will enforce that and you should be familiar with the university policy on academic integrity:
http://academicintegrity.rutgers.edu/academic-integrity-policy/

Use of external sources to obtain solutions to homework assignments or exams is cheating and a violation of the University Academic Integrity policy. Cheating in the course may result in penalties ranging from a zero on an assignment to an F for the course, or expulsion from the University. Posting of homework assignments, exams, recorded lectures, or other lecture materials to external sites without the permission of the instructor is a violation of copyright and constitutes a facilitation of dishonesty, which may result in the same penalties as explicit cheating.

**INTELLECTUAL PROPERTY**

The material for this course is copyrighted and may not be posted on any other web site without permission. Any lecture notes or supplementary material posted on Canvas is for your own use only. Any violation of this policy will be treated as an academic integrity violation **and will be referred to the Office of Student Conduct or Equivalent for action.**

Emails: We will do our best to answer emails within 48 hrs, however due to the large enrollment, questions where the information is already provided in the Syllabus/Canvas and/or Lecture announcements will not receive a response irrespective of the number of emails. *Please read all information on this syllabus and Canvas announcements carefully before emailing.*

## EXTRA HELP

Prepare for each recitation section by doing the suggested problems in the syllabus, and having questions ready for the recitation instructor.

Office hours will be posted on Canvas by the end of the first week of class. You can feel free to go to the office hour of any lecturer or recitation instructor. All lecturers and recitation instructors are committed to help you achieve success in the class.

The four Learning Center are there to help students navigate their courses and connect with support services. Please check their hours of operation at, https://rlc.rutgers.edu/help_desk,

For help with Rutgers libraries and computer labs, please check their website at: https://oit-nb.rutgers.edu/labs

## CONTACT INFORMATION

Course Coordinator
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Course Administrator and Lecturer
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Lecturers
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Recitation Coordinator
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Online Homework and Quizzes Coordinator
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