CHE202 – General Chemistry II, Summer 2024

**The College of New Jersey**

***Syllabus/Course Policy Across All Sections***

| **Section** | **Lecture/Lab Time\*** | **Instructor** | **email address** |
| --- | --- | --- | --- |
| A (lecture) | Synchronous online  Weeks 1-4  (7/15/2024 - 8/9/24):  TWR, 9:00 am-11:50 am  Week 5  (8/12/24 - 8/16/24):  MTW, 9:00 am-11:50 am | Dr. Rayza Rodrigues | [rosatavr@tcnj.edu](mailto:rosatavr@tcnj.edu) |
| A01 (lab)  In person | Weeks 1-4  (7/15/2024 - 8/9/24):  M, 8:00 am-4:50 pm  In person exams  Week 5:  (8/12/24 - 8/16/24):  R, 8:00 am-4:50 pm | Same as lecture |  |

This is a blended learning course where we have online and in person instruction. This is an intensive class that is very fast paced, especially over the summer. We recommend that students do not work or take another class during this time period.

The deep learning outcomes associated with TCNJ’s 4th hour are accomplished by the activities conducted in the scheduled laboratory section of this course.

**Textbook:** *Chemistry: Atoms First 2e* is a peer-reviewed, openly licensed introductory textbook. You can access this textbook for FREE at the following link (Click “View online” or “Download a PDF”): [**https://openstax.org/details/books/chemistry-atoms-first-2e**](https://openstax.org/details/books/chemistry-atoms-first-2e)

**Calculator:** A scientific calculator is recommended for the course (e.g. the TI30 is an affordable option)

**Computer:** See TCNJ recommendations for acceptable computers, we do not recommend using chromebooks.

**ACS Study Guide:** The final exam in this course is the standardized Full-Year General Chemistry ACS exam. To prepare for it, we will use the General Chemistry Study Guide. Each chapter is designed with an introductory section of the material, worked examples of typical, multiple choice questions (including a list of corresponding practice questions), and a series of practice problems to test the concepts collectively.

**3 notebooks will be required**

1. **Notes from lecture/class,** spiral bound or loose leaf in 3 ring binder
2. **Homework, Inclass work,** spiral bound or loose leaf in 3 ring binder

Using an ipad or another tablet device is an acceptable substitution to a paper notebook

1. **Laboratory notebook must be a composition notebook, this must be handwritten**

**Website:** This course will be managed within **Canvas** and you will be required to purchase access to **Aktiv Chemistry**. Instructions for purchasing access are below:

* Aktiv Chemistry is an online active-learning platform for chemistry. We will use Aktiv Chemistry for pre-class quizzes, in-class problems, and homework.
* Aktiv Chemistry can be purchased through your course’s Canvas site and will link directly with the company’s website. For those students that need to make a purchase at the bookstore, the bookstore will have access codes that can be purchased. The first 2 weeks are free so that should give you time to still do the work if you need to wait for your access codes.
* *Directions for accessing Aktiv Chemistry are included in the link below. You must be logged into your TCNJ google suite account to access the link.*

**Aktiv Access Instructions:** <https://drive.google.com/file/d/1qxgnrlT3wiSiiObCtQ0wg7F16relG7Nm/view>

**Synchronous online lecture:** We will meet through **InSpace** for lecture. See instructions [here](https://drive.google.com/file/d/10vjKJyejgxiZOl4q29hQpRJA2Trd9aEM/view?usp=sharing).

**Office Hours:** Office hours may be conducted in person or virtually, at the instructor’s discretion. Please make an appointment with the instructor.

**Email and Canvas:** These are the primary communication tools for this course. You must check it at least daily. Expectation for response times to student communications will be provided by your instructor. Check your Canvas page for further information.

**Diversity Statement**: This course is a safe place where you will be treated with respect, and the instructor welcomes individuals of all ages, social class, backgrounds, beliefs, ethnicities, gender identities, gender expressions, national origins, religious affiliations, sexual orientations, ability – and other visible and nonvisible differences. The campus wide diversity statement can be found here: <https://diversity.tcnj.edu/campus-diversity-statement/>

**Course Climate:** All members of this class are expected to contribute to a respectful, welcoming, and inclusive environment for every other member of the class. No one can know all the microaggressions that can be committed but members of this classroom will learn from corrections to create an inclusive environment (including the instructor). A safe space does not guarantee that students will not feel uncomfortable, which is part of the learning experience.

Beyond social identities, failure or difficulty with course materials may cause an uncomfortable climate. This classroom is a place to experience and recover from failures. See the instructor for support as soon as possible. Additional support can be found on this campus website: <https://academicaffairs.tcnj.edu/tcnj-syllabus-resources/>

**Preferred Name/Gender Pronouns:** The instructor will gladly honor your request to address you by an alternate name or gender pronoun. Please advise the instructor of this preference early in the semester so that records are changed.

**Class Philosophy:** Success in a college STEM course requires about **10-15 hours** of study/homework outside of this class/lab each week during a typical semester, but this study time depends on the individual. For a summer course, we cover approximately **1 week in a day’s class**, so each week is about 30 hours of work/study. You will be assigned pre-class reading and videos prior to each lecture, and you will be assigned post-lecture homework. By no means is this the only studying you should perform for this class. You will likely need to, through reviewing your own notes and feedback on your assessments, identify your own weaknesses in the course material and review the textbook, lecture notes, practice problems, and attend office hours for further clarification of material.

**Academic Integrity:** It is expected that students perform with a high level of responsibility and academic honesty. Cheating, plagiarism, and unauthorized collaboration are considered academically dishonest and will result in a failure of this course. Such dishonesty would include but is not limited to: submitting as his/her own a lab report outline, calculation, analysis etc copied or partially copied from the manual or any other printed source, another student or the web. Credit must be given for words quoted. The best way to learn chemistry is by engaging with the material directly and not relying on the work of others or online resources to simply find the answer. Ultimately, resorting to cheating to earn points in the course will only disadvantage the student in the long term. TCNJ’s academic integrity policy is available at the following link: <https://academicintegrity.tcnj.edu/>

**Study:** Students should be reviewing their notes, readings, and in-class problems immediately after class *and*before the next class.  This review should include looking at old problems and explaining how to do each step and why each step was taken.

**Assessments**

**Pre-Class Video Notes:** You will watch pre-recorded lecture videos from the general chemistry instructors. You must submit a PDF copy of your notes to be reviewed by your instructor for a grade. By preparing ahead of time, you will be ready to engage in active-learning activities during the class period with your instructor and peers. Any students repeating the TCNJ course will be expected to rewatch the videos and update their previous notes.

**Pre-Class Quizzes:** Aktiv Chemistry will be used to administer short (~10 min) pre-class quizzes associated with content from pre-recorded lecture videos. Grading will occur automatically within Aktiv Chemistry.

**In-Class Participation:** Students will work in virtual groups to answer Aktiv questions. You will be graded for in-class Aktiv Chemistry assignments performed as an active-learning assignment during class meeting time. Grading will occur automatically within Aktiv Chemistry. All students will submit handwritten work of their in class activities for review.

**Homework**: Assigned at each lecture, for the summer, homework is due the day after the content was covered in lecture at the end of the day. This helps students to pace their timing of their work. Grading will occur automatically within Aktiv Chemistry. Students will also upload their handwritten work of their homework at the end of each week.

**Laboratory:** The laboratory is a hands on and in person learning experience required for the manipulation and measurement of chemical reactions. Students will be doing safety analysis, experimental preparation, experimentation, data analysis, and discussions. In-person attendance is mandatory during the summer. Students must use their notebooks to write the pre-lab activity due before or at the beginning of the lab. Scanned laboratory reports will be graded within Canvas to allow students to view their past and current results at any time. The syllabus provides a schedule for assessments as well as lecture and lab experiment sequence. We anticipate that students will be able to finish their post laboratory assignments during the laboratory day.

**Chapter assessments:** Given 4 times throughout the summer as closed-book, in-person exams. These assessments will constitute 40% of the final course grade. Tentative dates and chapters covered for these assessments can be found in the table below. More information will be available in Canvas.

| **Chapter Assessment** | **Chapters covered** | **Date(s)** |
| --- | --- | --- |
| 1 | 10 and 11 | July 22, 2024 at 8:00 am |
| 2 | 12 and 13 | July 29, 2024 at 8:00 am |
| 3 | 14 and 15 | August 5, 2024 at 8:00 am |
| 4 | 16, 17 (up to 17.3) | August 12, 2024 at 8:00 am |
| Final | 1-17 | August 15, 2024 at 1:00 pm |

**Evaluation**: Below is the written course grading policy with the exact weighting of how the examinations, laboratory, and quizzes will count toward your final grade. The final composite score for the semester course will be determined according to the following percentages:

Chapter Assessments #1-4 40% of course grade

Final Assessment 20% of course grade

Video notes 5% of course grade

Aktiv assignments 10% of course grade

Written work submissions (homework and in class) 10% of course grade

Laboratory 15% of course grade

**Total 100%**

The final letter grade will be assigned according to the following composite percentage\*:

| **A–** = 91–94% | **A** = 95–100% |  |
| --- | --- | --- |
| **B–** = 80–83% | **B** = 84–88% | **B+** = 89–90% |
| **C–** = 70–71% | **C** = 72–77% | **C+** = 78–79% |
|  | **D** = 60–67% | **D+** = 68–69% |
|  | **F** = 60% and below |  |

\*Instructors use four significant figures when calculating final grades. Statistical adjustments may be made at the end of the course to normalize or maintain similar averages across the sections.

**Class/Lab Meeting Attendance:** This is a rapid pace blended learning. missing a day of course is equivalent to missing a week of content during a standard semester. We expect that students will attend all synchronous meetings including labs and complete all assignments on time. There will be no “extra-credit” assignments. The campus absence policy is here: <https://policies.tcnj.edu/?p=77>

**Online participation:** This course is designed to have synchronous online activities, and students must have their cameras on during class. Students will be using a new platform called InSpace and not Zoom. Students will be actively engaged during all synchronous sessions through group work. If a student loses connection, please email the instructor and log back into the room. If the instructor loses connection, please remain in class and await further instructions via email or Canvas. Please see Canvas for activities you will accomplish each day.

**Missed Chapter Assessment Policy:** This is a rapid pace blended learning summer course. Missed Chapter Assessments will be graded as 0%. You must inform your instructor if you are unable to attend class for a Chapter Assessment. If you have a valid reason for missing the Chapter Assessment, your Final Assessment grade will be used in place of your missed assessment grade and you will have an alternate assignment to complete. This option can be used once in the semester. You must submit documentation of your excuse to your instructor. Students missing the Final Assessment because of an **excused absence** will receive an incomplete grade, which must be made up within the time allowed by college policy. **If the Final Assessment is missed and unexcused, you will not pass the course.**

**Late Work Policy:** All assignments must be submitted by the due date as listed in Canvas and Aktiv Chemistry. Late work will not be accepted. If a due date is not listed, politely email the instructor.

**Dress code in Lab:** No open-toed shoes of any kind are permitted. Long hair must be tied back away from your face. Shorts, crop tops, sleeveless tops are not permitted. Safety glasses must be worn at all times in the laboratory.

**Laboratory Attendance:** This is a rapid paced blended learning Summer course. Each 9 hour lab day is the equivalent of three weeks of semester lab. Attendance is mandatory. Missing one day of lab, will be an automatic F in the course.

**Course Accessibility and Accommodations:** Students who experience barriers in this course are encouraged to contact the instructor as early in the semester as possible. The Accessibility Resource Center (ARC) is available to facilitate the removal of barriers and to ensure reasonable accommodations. Students who need additional time for in person exams will be expected to come early to take their assessment. For more information about ARC, please visit: <https://arc.tcnj.edu/>.

TCNJ’s Americans with Disabilities Act policy is available at: <https://policies.tcnj.edu/wp-content/uploads/sites/247/2018/01/The-Americans-with-Disability-Act-1.pdf>

Any student sensing the need for tutoring should avail themself of assistance from the Tutoring Center found in Roscoe L. West Hall, Suite 101, (609-771-3325) e-mail [tutoring@tcnj.edu](mailto:tutoring@tcnj.edu) Additional information is available at: [**http://tutoringcenter.tcnj.edu**](http://tutoringcenter.tcnj.edu)

A mid-semester progress report will be posted in PAWS indicating whether a student’s progress is satisfactory, unsatisfactory, or to caution students who are on the border of these two alternatives. It is hoped that this evaluation will initiate communication between the student and professor to allow improved performance in the course. **A minimum grade of C– is required in this course in order to continue in CHE202 and a minimum grade of C is required for retention in the chemistry major or minor.**

**The theoretical aspects addressed in the first semester of general chemistry are as follows. Eight chapters in** [***Chemistry: Atoms First 2e***](https://openstax.org/details/books/chemistry-atoms-first-2e) **are covered in the order that follows (specific chapters and sections can be found in the tentative agenda portion of this syllabus).**

**A chapter-by-chapter list of learning outcomes can be found at the following link:** [**https://docs.google.com/document/d/1YbD2mT2cqEcvVab49NsjefUrhO0EvCDPRy75fiyclxg/edit?usp=sharing**](https://docs.google.com/document/d/1Hhsvy6_4VpQM3LnUMX04fZgli7FpTNdYe2v3ki6lIf0/edit?usp=sharing)

Below is a tentative schedule of topics and laboratory experiments for the semester. Sections in the chapters to be considered as well as any other changes in the schedule will be announced in Canvas.

**Weekly Schedule**

| **Week** | **Monday** | **Tuesday** | **Wednesday** | **Thursday** |
| --- | --- | --- | --- | --- |
| Week 1 | 7/15 - In person | 7/16 - Online | 7/17 - Online | 7/18 - Online |
| Class introduction/syllabus | OpenStax: 10.1 - 10.3 (Intermolecular Forces, Properties of Liquids, Phase Transitions) | OpenStax: 11.1 - 11.3 (Dissolution Process, Electrolytes, Solubility) | OpenStax: 12.1 - 12.2 (Spontaneity, Entropy) |
| 9:30 AM Lab Check-in and Safety | OpenStax: 10.4 - 10.6 (Phase Diagrams, Solid State of Matter, Lattice Structures in Crystalline Solids) | OpenStax: 11.4 - 11.5 (Colligative Properties, Colloids) | Ch. 10 and 11 review |
| 1 PM Lab #1 - Vapor Pressure of Water |  |  |  |
| Week 2 | 7/22 - In person | 7/23 - Online | 7/24 - Online | 7/25 - Online |
| 8 AM Exam 1 - Ch 10 and 11 | Exam 1 reflection, review, and discussion | OpenStax: 13.1 - 13.3 (Chemical Equilibria, Equilibrium Constants, Le Chatelier's Principle) | OpenStax: 14.1 - 14.3 (Bronsted-Lowry Acids/Bases, pH//pOH, Strengths of Acids/Bases) |
| 9:30 AM Lab #2: Paper Chromatography | OpenStax: 12.3-12.4 (Second/Third Laws of Thermodynamics, Free Energy) | OpenStax: 13.4 (Equilibrium Calculations) | Ch. 12 and 13 review |
| 1 PM Lab #3: Physical properties |  |  |  |
| Week 3 | 7/29 - In person | 7/30 - Online | 7/31 - Online | 8/1 - Online |
| 8 AM Exam 2 Ch 12 and 13 | OpenStax: 14.4-14.5 (Hydrolysis of Salts, Polyprotic Acids) | OpenStax: 14.7 (Acid-Base Titrations) | OpenStax: 15.2 - 15.3 (Lewis Acids and Bases, Coupled Equilibria) |
| 9:30 AM Lab #4: Neutralization of an acid | OpenStax: 14.6 (Buffers) | OpenStax: 15.1 (Precipitation and Dissolution) | Ch. 14 and 15 review |
| 1 PM Lab #5: Titration of a polyprotic acid | Exam 2 reflection, review, and discussion |  |  |
|  | | | | |
| Week 4 | 8/5 - In person | 8/6 - Online | 8/7 - Online | 8/8 - Online |
| 8 AM Exam 3 Ch 14 and 15 | OpenStax: 16.1 - 16.2 (Review of Redox Chemistry, Galvanic Cells) | OpenStax: 16.5 - 16.7 (Batteries and Fuel Cells, Corrosion, Electrolysis) | OpenStax: 17.3 (Rate Laws) |
| 9:30 AM Lab #6: Ksp and common ion effect | OpenStax: 16.3-16.4 (Electrode and Cell Potentials, Potential/Free Energy/Equilibrium) | OpenStax: 17.1 - 17.2 (Chemical Reaction Rates, Factors Affecting Reaction Rates) | Ch. 16, Ch. 17.1-17.3 review |
| 1 PM Lab #7: Redox titration | Exam 3 reflection, review, and discussion |  |  |
| Week 5 | 8/12 - Online | 8/13 - Online | 8/14 - Online | 8/15 - In person |
| 9 AM Exam 4 Ch 16, Ch. 17.1-17.3 - online proctored | OpenStax: 17.6 - 17.7 (Reaction Mechanisms, Catalysis) | Catch up and review | 8 AM Lab #8: Iodine clock |
| OpenStax: 17.4 - 17.5 (Integrated Rate Laws, Collision Theory) | Nuclear Chemistry (no videos) |  | 1 PM Cumulative final exam |
|  | Exam 4 reflection, review, and discussion |  |  |

**Chapter 10: Liquids and Solids**

1. Intermolecular Forces
2. Properties of Liquids
3. Phase Transitions
4. Phase Diagrams
5. The Solid State of Matter
6. Lattice Structures in Crystalline Solids

**Chapter 11: Solutions and Colloids**

1. The Dissolution Process
2. Electrolytes
3. Solubility
4. Colligative Properties
5. Colloids

**Chapter 12: Thermodynamics**

1. Spontaneity
2. Entropy
3. The Second and Third Laws of Thermodynamics
4. Free Energy

**Chapter 13: Fundamental Equilibrium Concepts**

1. Chemical Equilibria
2. Equilibrium Constants
3. Shifting Equilibria: Le Chatelier’s Principle
4. Equilibrium Calculations

**Chapter 14: Acid-Base Equilibria**

1. Brønsted-Lowry Acids and Bases
2. pH and pOH
3. Relative Strengths of Acids and Bases
4. Hydrolysis of Salts
5. Polyprotic Acids
6. Buffers
7. Acid-Base Titrations

**Chapter 15: Equilibria of Other Reaction Classes**

1. Precipitation and Dissolution
2. Lewis Acids and Bases
3. Coupled Equilibria

**Chapter 16: Electrochemistry**

1. Review of Redox Chemistry
2. Galvanic Cells
3. Electrode and Cell Potentials
4. Potential, Free Energy, and Equilibrium
5. Batteries and Fuel Cells
6. Corrosion
7. Electrolysis

**Chapter 17: Kinetics**

1. Chemical Reaction Rates
2. Factors Affecting Reaction Rates
3. Rate Laws
4. Integrated Rate Laws
5. Collision Theory
6. Reaction Mechanisms
7. Catalysis