NEW JERSEY CENTER
FOR TEACHING & LEARNING

Progressive Science Initiative® (PSI®)
CHEM-4701: Chemistry

Course Credit: 1.0 Carnegie Unit

Dates & Times:
This course covers all of the content normally taught in a full-year course. While it will take approximately 120 hours to complete, it is asynchronous, which allows students flexibility in scheduling. The exact number of hours will vary based on each student's study style and preferences.

LMS Link:

COURSE DESCRIPTION:
This course contains the content of PSI Chemistry, a mathematically rigorous chemistry course that builds upon foundational topics in physics and leads to a better understanding of biology. Topics include atomic structure, periodic trends, bonding, chemical reactions, stoichiometry, properties of matter and solutions, kinetics and equilibrium and organic compounds.

This course aligns to Next Generation Science Standards (NGSS) and the New Jersey State Standards for Science.

STUDENT LEARNING OUTCOMES:
Upon completion of the course, the student will be able to:

1. Classify chemical and physical properties of materials using the structure and the arrangement of atoms, ions, or molecules and the forces between them.
2. Determine how changes in matter involve the rearrangement and/or reorganization of atoms and/or the transfer of electrons.
3. Utilize the laws of thermodynamics to describe the essential role of energy and explain and predict the direction of changes in matter.
4. Apply mathematical tools to solve chemistry problems.
5. Demonstrate mastery of Chemistry on a comprehensive exam.

TEXTS, READINGS, INSTRUCTIONAL RESOURCES:

Required Texts:

- This course uses a free digital text book accessible at:
  - https://njctl.org/materials/courses/chemistry-4/

COURSE REQUIREMENTS:
Students are expected to meet the following course requirements:

1. Activities: A number of different learning activities will ensure participant engagement and learning in the course. These include:
   - Engage in video module lessons which demonstrate minimized direct instruction followed by frequent formative assessment
   - Completion of formative assessments aligned to learning objectives which include detailed analysis when answered incorrectly.
2. Mastery Exercises: For each module, these multiple-choice question quizzes assess the content knowledge gained in a module. Participants have the opportunity to retake; random questions are pulled from a larger question bank on each attempt ensuring varied questions.
3. Virtual Labs: In each module, a virtual lab write-up will be submitted. Virtual labs are interactive lab simulations that promote discovery-based student learning through real-world applications and analysis.
4. Module Exam: One is completed at the end of each module. It is a culminating exam consisting of multiple choice and free response questions aligned to the standards and objectives of the module.
5. Final Exam: At the end of the course, a comprehensive exam consisting of Multiple Choice and Free Response questions assesses the content knowledge learned throughout the course.

GRADE DISTRIBUTION AND SCALE:

Grade Distribution:

Module Exams	70%
Final Exam	10%
Labs	10%
Mastery Exercises	10%

Grade Scale:

A	93 – 100
A-	90 – 92
B+	86 – 89
B	83 – 86
B-	80 – 82
C+	77 – 79
C	73 – 76
C-	70 – 72
D	60.0 – 69.9
F	59.9 or below

ACADEMIC INTEGRITY:
Students must assume responsibility for maintaining honesty in all work submitted for credit and in any other work designated by the instructor of the course. Academic dishonesty includes cheating, fabrication, facilitating academic dishonesty, plagiarism, reusing /re-purposing your own work, unauthorized possession of academic materials, and unauthorized collaboration.

DISABILITY SERVICES STATEMENT:
We are committed to providing reasonable accommodations for all persons with disabilities. Any student with a documented disability requesting academic accommodations should contact the Dean of Students, Dr. Rosemary Knab, additional information to coordinate reasonable accommodations for students with

documented disabilities (rosemary@njctl.org).

NETIQUETTE:
Respect the diversity of opinions among the instructor and classmates and engage with them in a courteous, respectful, and professional manner. All posts and classroom communication must be conducted in accordance with the student code of conduct. Think before you push the Send button. Did you say just what you meant? How will the person on the other end read the words?

Maintain an environment free of harassment, stalking, threats, abuse, insults or humiliation toward the instructor and classmates. This includes, but is not limited to, demeaning written or oral comments of an ethnic, religious, age, disability, sexist (or sexual orientation), or racist nature; and the unwanted sexual advances or intimidations by email, or on discussion boards and other postings within or connected to the online classroom.

If you have concerns about something that has been said, please let your instructor know.

CLASS SCHEDULE:

Module	Required Readings	Assignments
0 – Optional Physics Review	• Optional presentations	• None
1 – Atomic Origins	• PDFs of presentations within the module.	• Lab • Mastery Exercise • Module Exam
2 – Atomic Structure	• PDFs of presentations within the module.	• Lab • Mastery Exercise • Module Exam
3 – The Periodic Table	• PDFs of presentations within the module.	• Lab • Mastery Exercise • Module Exam
4 – Ionic Bonding & Ionic Compounds	• PDFs of presentations within the module.	• Lab • Mastery Exercise • Module Exam
5 – Covalent Bonding & Molecular Compounds	• PDFs of presentations within the module.	• Lab • Mastery Exercise • Module Exam

6 – Intermolecular Forces	• PDFs of presentations within the module.	• Lab • Mastery Exercise • Module Exam
7 – Mole Calculations	• PDFs of presentations within the module.	• Lab • Mastery Exercise • Module Exam
8 – Chemical Reactions	• PDFs of presentations within the module.	• Lab • Mastery Exercise • Module Exam
9 - Stoichiometry	• PDFs of presentations within the module.	• Lab • Mastery Exercise • Module Exam
10 - Gases	• PDFs of presentations within the module.	• Lab • Mastery Exercise • Module Exam
11 – Thermochemistry Part 1	• PDFs of presentations within the module.	• Lab • Mastery Exercise • Module Exam
12 - Thermochemistry Part 2	• PDFs of presentations within the module.	• Lab • Mastery Exercise • Module Exam
13 – Acids & Bases	• PDFs of presentations within the module.	• Lab • Mastery Exercise • Module Exam
14 – Kinetics & Equilibrium	• PDFs of presentations within the module.	• Lab • Mastery Exercise • Module Exam
15 – Final Exam	• N/A	• Final Exam