Chemistry

Mr. Marvin W. Retzer

Yearlong Course

2023-2024

Eligible Student:

10th–12th graders welcome. This course is designed as a college preparatory Chemistry course; you must have taken, or be enrolled in, Algebra 2. This will be a rigorous, fast-paced course and you will be expected to do work outside of our regular three class days.

Please note: This course is the equivalent of one high school credit in science.

Required Texts:*

General Chemistry (Student Edition), **2021 Third Edition;** *The Student Lab Report Handbook* (Second Edition, 2022); *Chemistry Experiments: for High School at Home* (2014)

*Required texts are not included in the purchase of the course.
**Classical Academic Press released a NEW Revised Edition of this text as of 2021. The new revised edition (Third Edition) is required for this course. Older versions of the student edition and answer key are not compatible with the course.

NOTE: While our primary text will be *General Chemistry*, the teaching staff will be adapting and augmenting the curriculum as they see best for the learning objectives of the course. *The Lab Report Handbook* and the *Chemistry Experiments: for High School at Home* handbook are also both required for this course. This may include videos. As such, students should also be prepared to possibly print PDF files supplied by the instructors. Students should know that while they are free to complete any activities from the book on their own time, we will not be completing every exercise and reading available in the textbook as a class.

Course Schedule

Orientation session:
The date and time of the student/parent orientation will depend on the particular section in which you are enrolled, but all orientation sessions will be scheduled for August 28, 2023 prior to the start of the class.

Class session dates: The dates of your class depend on the particular section in which you are enrolled. Consult the Scholé Academy academic calendar for details concerning scheduled, school-wide breaks.

Office hours: Your teachers are available outside of scheduled class times! During "Office Hours" students may raise questions, seek assistance, or review class material. This can happen via email or a meeting in the Zoom classroom. Your teacher will do their best to respond within 24-48 hours; please keep in mind that they likely will not respond immediately to messages after 5 p.m. EST.

Course Description

Chemistry is all about electrons and the electrical forces of the atom and between atoms in the formation of molecules. Chemistry involves accuracy of measurement and the necessity of the recording of accurate observations. The minimization of energy is a driving force within chemical reactions. All of these facets come together in the wonderful study of Chemistry!

The course map highlights the key points of study to be covered each quarter. By the end of the year students will have covered several different types of bonding and several different types of reactions. They will be familiar with atomic structure, periodic law, gas laws, solutions, acids and bases and much more! Students will discover the **wonder** and astounding breadth of chemistry; the realization of the **integration** of mathematics, measurement, written descriptive prose and cross connections between Chemistry and other sciences; our focus will be on the **mastery** of course content and procedures; and, finally, an appreciation for magnificent majesty and breadth of God's **kingdom**.

Latin 1 teaches hundreds of vocabulary words, meaning that students will be required to memorize and consolidate a lot of vocabulary each week. The teaching staff will provide them with access to online flashcards through quizlet to help encourage systemic and consistent review. We shall explore different means of dwelling in the language, including some of the memory techniques used by the ancient and medieval authors themselves. Speaking the language will be practiced and encouraged through practices such as reading aloud, responding to questions in Latin where possible, and engaging in simple conversation. The aim of this is that we are not simply training ourselves to be good translators, but also to develop an intuitive feel for the language. There are also a number of fun resources available on My Library from Classical Academic Press, accessed via the Scholé Academy website, which students might like

to use for interactive vocabulary learning. Lessons will be supplemented with readings and historical studies which put the language into its ancient context.

Homework will consist of written exercises, memorization of vocabulary and review for assessments. Students will also be required to record and submit their experiment results in their old notebooks. This will enable them to study well for assessments as well as provide a reference for translations and exercises.

We have planned to cover all 12 chapters of the textbook with the intention that students will have a good foundation and preparation for their college Chemistry classes. **However, some flexibility may be exercised to adapt the pace if, after correspondence with students and parents, the need should arise to proceed more slowly.** Mastery is ultimately more important than quantity – *multum, non multa!* Nonetheless, we will attempt to cover the full 12 chapters.

Course Map

QUARTER 1

1. Measurement: review of the metric system
2. Measurements used for volume, matter, mass, etc. and conversions
3. Accuracy & precision and using scientific notation
4. Atoms and substance - atoms, molecules, types of substances
5. Isotopes, atomic masses, molar masses, formula mass
6. Atomic structure - Bohr model & quantum model, electron configuration, empirical formulas

QUARTER 2

1. Periodic law - periodic table configuration, properties and trends
2. Chemical Bonding
3. Ionic bonding
4. Covalent bonding
5. Metallic bonding
6. Hydrogen bonding
7. Intermolecular & Van der Waals forces

QUARTER 3

1. Chemical equations
2. Types of chemical reactions: Synthesis, decomposition, single & double replacement, combustion, acid-base, & oxygen reduction (Redox)
3. Stoichiometry calculations
4. Kinetic Molecular Theory: Pressure & temperature
5. States of matter: solid, liquid, gas & plasma and transitions
6. Heat of fusion & vaporization
7. Gas Laws: Boyle's, Charles', Avogadro's, Ideal Gas
8. Dalton's Law of partial pressure

QUARTER 4

1. Dissolution, solubility, concentration of solution
2. Aqueous solutions & colligative properties
3. Acids & Bases
4. Redox chemistry: oxidation reduction & electrochemistry

Student expectations: executive function skills

Students enrolling in Scholé Academy's Chemistry (Honors) will be expected to show development of Executive Function Skills throughout the year. Executive Function Skills speaks to a set of qualities and skill sets students can develop and hone the better to approach the courses, lectures, readings, and teachers they will encounter in their future academic coursework.

Since we are learning together, it is of utmost importance that students come to class with a courageous willingness to make attempts without worrying about making mistakes. In this spirit, the classroom will be an environment of respectful, joyful, and friendly learning, which will facilitate the study of science.

This disposition is that of an 'engaged student'. Scholé Academy commends four other important skills which ought to be observed by students.

1. **An Engaged Student:** One who is willing to step into the arena of class discussion, ask questions, supply answers, and consider how the discussion at hand applies to oneself.

2. **Note Taking:** A student must be engaged with the class by taking notes on important and relevant content in an organized fashion. They should then independently consult those notes for assignments and in preparation for assessments. It is essential that all students acquire a notebook for use during the class, as this will keep them organized by subject.

3. **Attention to Detail & Preparedness:** These students are ones who consistently adhere to deadlines, submission requirements, adhere to style guides and codes, confirm technology is working prior to the start of class, are responsible to determine how to proceed after an absence, are responsible for consulting their course syllabus and adjusting as the class proceeds, etc.

4. **Critical Reflection:** These students are ones who receive feedback to their submissions, and then apply that feedback to future assignments rather than repeating mistakes. These students also glean information from the live class critiques of fellow students and learn from others what mistakes to avoid.

5. **Initiative/Maturity:** This student will be proactive in listening to the teacher's comments, assessing how they apply to his/her work, taking the initiative to schedule office hours with the teacher if necessary.

Student Expectations in Action

Students will be following the sequence of study contained in *General Chemistry*. **The primary goal for the student will be to acquire a solid foundation in their understanding of Chemistry. The greater goal is that students develop an appreciation of the beauty and majesty of God's creation. This appreciation will inform their other studies and their lives in the world.**

Some student work will be completed in the textbook. However, a significant portion of the class will involve regular classroom participation, taking notes and studying vocabulary listed in the textbook. Students will receive homework derived from exercises in the textbook and may receive additional supplementary exercises designed by the department. Students will also be required to engage in scientific experimentation.

During class time, students will review answers, pose questions, and explain and justify their answers and solutions. They will be required to take notes documenting the new content covered in each class.

In this class, students will be expected to listen attentively and participate actively in class discussions and practices. This includes active involvement when reading aloud, relaying answers, and engaging in simple teacher-led conversation. Students are expected to arrive at class on time with all assigned material completed. The instructor will facilitate learning for the student, but the responsibility for staying up-to-date with classwork and assignments is ultimately the responsibility of the student.

Students who have not submitted their homework to the appropriate assignment folder prior to the start of class may not be permitted to join the live class session. Those students may possibly be asked to leave the Zoom session to work privately until they have completed the day's assignment. After they have completed their homework submission, they may be permitted to rejoin the class in session. Time spent in a breakout room will constitute an absence from class.

All assignments will be due in the appropriate assignment folder prior to the start of class each day. Students turning in late work will not be able to receive full credit. Students will submit their work by scanning their homework pages and uploading it into the assignment window as one PDF document. **Photographs of completed assignments will not be accepted as they are incredibly difficult to read.**

Student Grading and evaluation

While pursuing Chemistry (Honors) through Scholé Academy will be "restful" and enjoyable, we also recognize the need to provide grades for students who will be using this course as part of their prepared college transcript. It's a delicate balance to achieve both restful learning and excellent academic performance. Earning a specific grade should not overshadow achievement goals for mastery of this discipline. Chemistry (Honors), is a "core" discipline (Science) in Classical Education and learning to own the concepts introduced in this class will be a necessary and significant component of future success in upper-level Classical Education. In that sense then, attaining a mastery of Chemistry is its own reward, though the teacher will assign the following grades to your student's level of achievement: *magna cum laude* (with great praise); *cum laude* (with praise); *satis* (sufficient, satisfactory) and *non satis* (not sufficient).

Ideally, every average student working diligently should do praiseworthy work (*cum laude*). Those who excel beyond this expectation will receive *magna cum laude* for their efforts. Work which demonstrates minimal but sufficient mastery will be designated *satis*. *Non satis* designates work that demonstrates insufficient mastery; a student with a consistently *non satis* grade will not be recommended for continuation to the next level of Science. Additionally, we will provide a transcript with a traditional percentage grade to the requesting parent at quarterly intervals. All students will receive both a Scholé evaluation and a percentage grade at the end of the year.

Student evaluation : Mastery Portrait

In this course students will receive the foundations of scientific training that will set them on the path to full mastery of the sciences. A knowledge of Chemistry will also lead to a more sophisticated understanding of the breadth and depth of the sciences. This course will provide the components necessary to achieve mastery of the foundations of Chemistry, and help students develop an analytical mind. A strong understanding of Chemistry

and learning about the cultural context of the sciences we study will also help engage the student in development of their moral virtues. These three aspects of the course would comprise the "learning target".

1. At the completion of this course *cum laude* students will have achieved a demonstrable understanding of the facets of Chemistry taught in this class.
2. Additionally, they will have attained the skills necessary to conduct thorough and accurate experiments using the Scientific Method and provide thorough and accurate reporting.
3. Students will also be guided in development of the virtues of Truth, Goodness and Wisdom and how these core elements correlate to the study of God's creation - Chemistry.

Student Evaluation: Assignments, Types & weights

The teacher will communicate with students regarding assignment feedback and grading through the free online grading system, Canvas. The teacher will provide students with more detailed information and access to the Chemistry (Honors) course page.

Students' grades will have the following weight (out of 100):
1. Class Participation: 10
2. Homework assignments: 20
3. Regular Quizzing: 20
4. Lab Reports: 20
4. Regular Testing: 30

The incremental nature of the assessments is in place to ensure that students are continually reviewing previous material.

Typically Speaking:
- magna cum laude is the grade range of 94% or above.
- cum laude is the grade range of 85-93%
- satis is the grade range of 75-84%
- non satis is any grade lower than a 75%

This reflects the student's mastery and ability to move on to the next level.

Students and their parents will receive quarterly feedback from their teachers in the form of a quarterly update.

Student Evaluation: Academic Integrity

Students will often take tests and/or quizzes privately at home. Students are on their honor to abide by Scholé Academy's Learning Philosophy which assumes the personal cultivation of Student-Virtues described in the Student-Parent Handbook. We ask that parents proctor quizzes and tests to help keep their children accountable.

Specifically, cheating and plagiarism are punishable offenses. Copying the work of other students is prohibited and proper citation of all sources is essential.

The Virtual Classroom:

We will be using the free online "virtual classroom" software provided by Zoom. The live, interactive nature of our courses is foundational and we require cameras to be on during all class sessions. The virtual classroom will provide students with interactive audio and an interactive whiteboard in which texts, diagrams, video and other media can be displayed and analyzed. We will provide students with a link (via email) that will enable students to join the virtual classroom. Courses will be managed through our learning management system, Canvas.

Specific information regarding the technology used by Scholé Academy (including required technology) can be found by visiting the Technology in the Classroom section of the Student Parent Handbook.

About the Instructor

Mr. Marvin W. Retzer, Chemistry Instructor, began teaching in 1977. He holds a Bachelor of Science degree in Elementary Education from Grace College, a Master of Arts degree in Christian School Administration from Grace Theological Seminary and completed EdD (ABD) studies at Ball State University in Educational Leadership with a Curriculum cognate. Mr. Retzer began his undergraduate studies in medical research before switching to Elementary Education and, with his extensive Math and Science background, has taught MS-HS Math and Science classes for over 20+ years in addition to work in administration. Mr. Retzer's personal scientific "love" is for Chemistry and he was privileged to receive a summer Eisenhower Fellowship in the 1980's to study Microscale Chemistry at MIT in Boston.

Mr. Retzer's goal is for all students to see the majesty and power of God in creation through the study of the Sciences. "*All things were made through Him, and without Him was not anything made that was made.*" (John 1:3 ESV)

Please note: While this syllabus addresses details specific to this course, it is not extensive. Parents should also read the Student-Parent Handbook located on scholeacademy.com and be familiar with the ideas, policies, and procedures outlined.