SCHOLÉ ACADEMY
CLASSICAL ACADEMIC PRESS

Honors Chemistry Course & Lab

Yearlong 2019/20

ELIGIBLE STUDENTS:

10-12th graders who are either taking Algebra II concurrently or have already taken Algebra II. Students must also be able to read the text, take notes, memorize vocabulary and express themselves through written laboratory reports. They must have the maturity to study regularly, keep pace with the course and dedicate the time needed to complete the work.

Please note: Students enrolled in this course will complete **seven** formal laboratory experiments and six written reports that adhere to a specific rubric for scientific writing. A parent is expected to be present during the formal experiments to assure safety and adherence to the protocols. There are additional, informal investigations utilizing household items that supplement certain concepts in chemistry. The laboratory supplies will need to be collected prior to class and the students must be ready to conduct the experiments during organized class time. The student completing this course earns one high school course credit.

Class Dates: Begin Wednesday, September 4, 2019; running through Friday, May 22, 2020.
Class Times: Monday, Wednesday & Fridays: 12:30 — 1:45pm (EST)
Instructor: Dr. Kathryn Morton
E-mail: kmorton@scholeacademy.com

SCHEDULE FOR *HONORS CHEMISTRY:*

CLASS SESSIONS DATES:

Classes will take place on Monday, Wednesday & Fridays: 12:30 — 1:45pm (EST)
for 32 weeks and 95 classes on the following dates* --

September (12): 4, 6, 9, 11, 13, 16, 18, 20, 23, 25, 27, 30
October (13): 2, 4, 7, 9, 11, 14, 16, 18, 21, 23, 25, 28, 30
November (10): 1, 4, 6, 8, 11, 13, 15, 18, 20, 22, **[Thanksgiving Break]**
December (6): 2, 4, 6, 9, 11, 13, **[Christmas Break]**
January (12): **[Christmas Break]**, 6, 8, 10, 13, 15, 17, **[End 1st Semester]**, 20, 22, 24, 27, 29, 31
February (9): 3, 5, 7, 10 12, 14, [**Winter Break**], 24, 26, 28
March (13): 2, 4, 6, 9, 11, 13, 16, 18, 20, 23, 25, 27, 30
April (10): 1, 3, **[Holy Week]**, 13, 15, 17, 20, 22, 24, 27, 29
May (10): 1, 4, 6, 8, 11, 13, 15, 18, 20, 22 **[End 2nd Semester]**

**Please note the above dates and times are the anticipated class sessions for this course. However, all dates are subject to change as the instructor's circumstances might dictate (e.g. illness, family emergency). Any classes canceled by the instructor will be made up at an alternate time designated by the instructor.*

HONORS CHEMISTRY COURSE MAP

QUARTER 1 (Sept 4-Oct 26)

1. Intro: What is Chemistry All About?
2. (1) Measurements
3. (2) Atoms and Substances
4. Experiment: Separation of Components in a Mixture
5. (3) Atomic Structure

QUARTER 2 (Oct 27-Jan 18)

1. Experiment: Determining the Empirical Formula of a Copper Chloride Hydrate
2. (4) The Periodic Law
3. (5) Chemical Bonding
4. (6) Molecular Theory and Metallic Bonding
5. Essay: Famous Scientists And Their Contributions to Chemistry

QUARTER 3 (Jan 19-Mar 21)

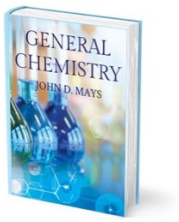
1. (7) Chemical Reactions and Stoichiometry
2. (8) Kinetic Theory and States of Matter
3. Experiment: Calorimetry of Organic Compounds
4. (9) The Gas Laws
5. Experiment: Mole Amount of a Gas

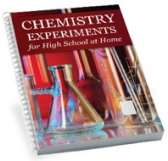
QUARTER 4 (Mar 22-May 22)

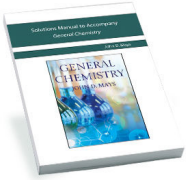
1. (10) Solution Chemistry
2. (11) Acids and Bases
3. Experiment: Acid-Base Titration
4. Experiment: Effectiveness of Antacids
5. (12) Redox Chemistry
6. Experiment: Titration Curves and K_a

OFFICE HOURS: Wednesdays 11:30am-12:30pm. In addition to scheduled class times, this is an *optional* weekly session where students may raise questions, seek assistance, or review class material. Students do NOT need to stay for the whole hour, but they must let the instructor know by 11:30 if they will be attending that day.

REQUIRED COURSE TEXTS AND SUPPLIES:






1) *General Chemistry* by John D. Mays, Novare Science and Math, 2016. ISBN 978-0-9972845-1-5
2) *Chemistry Experiments for Highschool at Home* by Christina H. Swan and John D. Mays, Novare Science and Math, 2019. ISBN: 978-0-9904397-7-6
3) *The Student Lab Report Handbook: A Guide to Content, Style, and Formatting for Effective Science Lab Reports* 2nd Ed. by John D. Mays. Novare Science and Math. 2014.
4) *Solutions Manual for General Chemistry* by John D. Mays. Novare Science and Math 2014. *This is a companion answer key to the problems in the text allowing students to check their work.* ISBN 978-0-9883228-9-9. Do **not** purchase the *complete* solutions manual (teacher only).
5) *Economy Lab Kit for use with Novare General Chemistry,* Home Science Tools.
6) Household Items for Lab: Sand (sand box sand or other coarse sand), aluminum foil, soda can, ethyl or isopropyl alcohol (>90%) (16oz), baking soda, long-tipped butane lighter, distilled water, straight pin, three types of antacids (more info to come).
7) Scientific calculator
8) Index cards
9) Spiral notebook or loose-leaf
10) 3-ring binder
11) Graph Ruled Composition book for lab exercises

OPTIONAL COURSE TEXTS: Papers and essays will be submitted using basic MLA formatting guides. The *MLA Handbook for Writers of Research Papers* — 7th Edition may be a helpful resource.

HONORS CHEMISTRY COURSE DESCRIPTION:

Preparedness: Honors Chemistry is for juniors and seniors who have taken, or are concurrently taking, Algebra II. The course utilizes mathematical skills such as algebraic manipulations of equations, ratios and proportions, unit conversions and significant figures. Toward the end of the course we will do pH calculations using logarithms and power functions.

Content: The course text, *General Chemistry* by John D. Mays, 2nd Ed., contains twelve modules covering topics in measurement, atoms and substances, atomic structure, periodic law, chemical bonding, molecular theory and metallic bonding, chemical reactions and stoichiometry, kinetic theory and states of matter, gas laws, solutions, acids and bases, and redox chemistry.

Mastery: In order to prepare students for college level chemistry, this course uses a mastery approach. This is achieved by covering fewer concepts at a deeper level. Our goal is to have a solid, working comprehension of these concepts and to apply the mathematical calculations accompanying them. Mastering these concepts now will create a tremendous foundation upon which higher level concepts can build in college. Regular review of important "standard problems" throughout the year will keep concepts relevant and fresh. Students will be expected to keep up with the daily work load of reading the text, taking notes, attending class, and completing the practice problems. This will get easier as good skills and habits are developed.

Integration: This course approaches science holistically, integrating history, mathematics, English language, faith, and the epistemology of science. During class we will contemplate and discuss these topics and outside of class students will write about them. We will consider the existence of scientific findings which may contradict biblical statements and explore meaningful, productive responses to them. We will discuss bias and how it affects science.

Laboratory: A good scientist must understand well-designed experimentation, the proper interpretation of results, and precise communication of his/her findings. The robust, high quality laboratory component for Honors General Chemistry consists of seven full experiments using laboratory-grade materials. The laboratory text *Chemistry Experiments for High School at Home* by Christina Swan and John D. Mays, accompanies the text closely. Guidelines for lab report writing will follow *The Student Lab Report Handbook* by John D. Mays. Supplies can be found at Home Science Tools under the name "Economy Lab Kit for use with Novare General Chemistry".

NOTE: Parents will be expected to be present during laboratory exercises to ensure the safety of their student and the following of proper procedure. Together they will pre-read the exercise and set up supplies prior to class time. Procedures will be followed during scheduled class time. Questions can be asked to the instructor during the exercise.

Grading: The grade will be based on several components: participation in class, quizzes, tests, essay, and six written laboratory reports.

STUDENT EXPECTATIONS: EXECUTIVE FUNCTION SKILLS

Students enrolling in Scholé Academy's Logic Program 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 to better approach the courses, lectures, readings and teachers they will face in their future academic coursework.

Each teacher will invariably have his own set of requirements and skills he requires students to bring to their studies. *Generally* speaking, I believe there are five such qualities that are necessary for my students in various subjects; and I believe they would be accepted as "good" by many other teachers as well.

1. An Engaged Student: One who is willing to step into the arena of class discussion, ask questions, supply answers, generate the internal dialogue necessary to determine if what's being discussed is important and necessary to himself.

2. Note Taking: A student who during and after being engaged with the class has been trained to note important and relevant content in an organized fashion (Cornell Notes would be a great option). His notes would then be consulted, independently, for application in assignments and assessments.

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

4. Employ Critiques: These students are ones who receive feedback to one of their submissions, and then are sure to apply that feedback to future assignments rather than repeating mistakes. These students also glean information from the live class critiques of fellow students and note mistakes to avoid by learning from others.

5. Initiative/Maturity: This student would hear the teacher comments and be able to assess whether or not the teacher was describing his work, and then take the initiative to schedule office hours with his teacher if necessary.

STUDENT EXPECTATIONS IN ACTION

In this class, students will be expected to listen attentively, participate actively in class discussions and practices. Students are expected to arrive to class on time and 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 ultimately falls to the student.

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

All assignments will be due into the appropriate Schoology Assignment folder prior to the start of class each day. Students turning in late work will earn a 10% penalty for each day the assignment is late. Students will submit their work by scanning their homework pages and uploading it into the Schoology assignment window. Photographs of completed assignments will not be accepted as they are incredibly difficult to read.

STUDENT EVALUATION: GRADING

While pursing *General Chemistry* through Scholé Academy will be "restful" (undistracted time to study the things most worthwhile, usually with good friends in a beautiful setting), 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 is one type of science, and mastery in General Chemistry will strengthen a student's understanding and other science disciplines like biology, physics and technology, as well as future study in college chemistry. I can 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 be the *magna cum laude* students, able to teach the content back to lower students. Students who do adequate but not praiseworthy work be designated *satis*. *Non satis* means lacking sufficiency or adequacy.

Inasmuch as you might be fully on board with this grading method in theory, there will undoubtedly be the need to complete a college transcript with either a numeric or traditional letter grade. Traditional percentage grades will be provided and will be readily accessed on the *General Chemistry* Schoology page. Additionally, Dr. Morton will provide a transcript of that grade to the requesting parent at the end of the year.

STUDENT EVALUATION: MASTERY PORTRAIT

Mastery portrait: Students who are prepared to take this class are typically early to late teens, adolescents approaching young-adulthood. This developmental stage is an interesting one, brimming with lots of new characteristics. It's imperative, then, that this course not only provide the academic components necessary to achieve mastery of the content of the class (knowledge) and skills associated with analytical thought; but to also help engage the student in development of their intellectual virtues. These three aspects of the course would comprise the "learning target".

- At the completion of this course *cum laude* students will be able to do the following :
- Use metric system and significant figures fluently.
- Understand and mathematically represent atoms and substances, their density, molar mass and molar number.
- Describe Bohr's model, electron configurations, % composition, empirical formulas and molecular formulas.
- Sound understanding of periodic table and laws.
- Describe various bonds, draw Lewis structures, name compounds and write formulas.
- Understand and apply molecular theory and metallic bonding, intermolecular forces, bond angles, and bond strengths.
- Balance chemical equations, perform stoichiometric calculations, and predict reaction types.
- Describe and apply kinetic theory, explain surface tension, states of matter, and calculate energy of phase changes.
- Understand and apply gas laws
- Gain thorough working knowledge of solutions
- Learn acid-base-chemistry theories, write equations, describe and compute pH, titrate reactions.
- Learn eight significant historical figures in chemical history and describe their contributions to the field.

- Students will also be guided in development of the virtues of love, humility, patience, constancy, perseverance, and temperance toward their work, classmates and instructor. They will likewise be encouraged to make concerted effort to fight against intellectual vices like pride, dishonesty, envy, slothfulness, sensuality, irritation/impatience, and excessive ambition. Significant advancements in the areas of virtues plus content and scholarship will lead to the mastery designation of *magna cum laude*.

STUDENT EVALUATION: ASSIGNMENTS, TYPES & WEIGHTS

Dr. Morton will communicate with students regarding assignment feedback and grading through the free online grading system, Schoology. She will provide students with more detailed information and access to the General Chemistry course page.

Student's grades will be comprised of:
1. Exams: 30%
2. Class Participation: 10%
3. Quizzes: 20%.
4. Paper: 10%
5. Laboratory Reports: 20%
6. Final Exams: 10%

1st quarter: 15% 2nd quarter: 25%
3rd quarter: 30% 4th quarter: 30%

STUDENT EVALUATION: ACADEMIC DISHONESTY

Students will often take assessment 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 and honesty described in the Student-Parent Handbook.

Additionally, plagiarism is a serious and punishable offense. Proper citation of all sources is essential to the academic endeavor. Remember to cite any source if the information is not common knowledge or is an opinion obtained through any source. A plagiarized assignment will result in a failing grade. Students should consult their chosen style manual (see Student Expectations above) for specific direction on obtaining, quoting and paraphrasing sources.

THE VIRTUAL CLASSROOM:

We will be using the free online "virtual classroom" software provided by Zoom, one of the leading companies that provides such software. The virtual classroom will provide students with interactive audio, text chat 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.

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.

Students will submit documents by scanning and uploading them to their personal computer, then attaching those files as .pdfs to an email. They will submit their work to the *General Chemistry* Schoology assignment page (access granted after enrollment is secured).

ABOUT THE INSTRUCTOR:

Kathryn Morton earned her BA in Biology from Illinois Wesleyan University and her DVM from the University of Illinois. Upon graduation from veterinary school, she moved to Pennsylvania to work as a clinical research veterinarian on a large dairy farm. From there she transitioned to a busy, small animal practice doing medicine and surgery. When the call of homeschooling touched her heart, she left private practice to focus on her husband and six children.

She has been teaching math and science courses to the homeschooled students in her local community for 13 years and she heads a robotics club at her town's public library. She is a lifetime learner and enjoys teaching students about the beauty of the creation and helping them grasp complex topics.