



NSCI 101 7981 PHYSICAL SCIENCE LABORATORY (2178) NSCI-101

Fall 2017 Section 7981 1 Credits 10/23/2017 to 12/17/2017

FACULTY CONTACT

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COURSE DESCRIPTION

(For students not majoring or minoring in a science. Fulfills the laboratory science requirement only with previous or concurrent credit for NSCI 100.) Prerequisite: MATH 012 or higher. Prerequisite or corequisite: NSCI 100. A laboratory study of the basic principles of physics and chemistry, with applications to geology, oceanography, meteorology, and astronomy. The objective is to apply the scientific method and use scientific and quantitative reasoning to make informed decisions about experimental results in the physical sciences. Discussion and laboratory activities cover the development of scientific thinking, the scientific method, the relationships among the various physical sciences, and the role of the physical sciences in interpreting the natural world.

COURSE INTRODUCTION

This class is an introductory laboratory course that illustrates the basic concepts of physics and chemistry as they apply to everyday life as well as to the fields of astronomy, geology, oceanography, or meteorology. This lab course is designed to be taken concurrently or subsequently after the companion survey course NSCI 100: *Introduction to Physical Science*.

NSCI 101 will begin with an introduction to the scientific method and its practical application to science as well as to everyday questions and problems. Upon this foundation, the principles of physics and chemistry will be illustrated through a series of hands-on experiments. These experiments will require the formulation of hypotheses, the design and execution of experiments, and the collection and interpretation of data and observations. This course also will require the use of mathematics and quantitative reasoning, as well as the purchase of various common and inexpensive household items for the experiments.

COURSE OUTCOMES

After completing this course, you should be able to

- apply the scientific method to explore and/or confirm physical science concepts, laws, and theories
- use technology and scientific reasoning to collect, analyze, and present data

COURSE MATERIALS

Click to access your course materials information (<http://webapps.umuc.edu/UgcmBook/BPage.cfm?C=NSCI%20101&S=7981&Sem=2178>)

CLASS GUIDELINES

A. Orientation to Science Courses

Science Learning Center (SLC). You can enter this site from under Course Content. The SLC houses a set of instructional and support materials of use across the science curriculum. Currently, the SLC houses two items:

1. The Scientific Method Tutorial - This module provides an excellent description of the Scientific Method. This method is integral to all science, and is important for our course.
2. The Science Studies Tutorial - This piece is designed to provide students with some tips and strategies for taking a science course. Some of the strategies in this unit are generic and apply to students' general study habits for all courses. Other segments of the unit are specific to taking a science course. This unit is short and should not take more than 30-40 minutes to complete. I recommend that you read the unit during the first couple of weeks of the semester. **If you have difficulty with science, then the Science Study Skills Unit is a MUST READ.**

B. Orientation to College Writing

1. i. College Writing Essentials

- Majority of content is written in the student's own words, and directly quoted content is limited to less than 10% of total content
- Introduction previews the main points, and conclusion summarizes main points
- Ideas are presented clearly, follow sound logic, and flow coherently and cohesively
- Content is expressed using standard grammar, punctuation and spelling conventions
- Paragraph content reflects reasonable transitions
- Content reflects synthesis and critical analysis of referenced sources
- Ideas are supported by referenced evidence, and full citations are provided for all reference sources

1. **UMUC Writing Resources** (<http://www.umuc.edu/ewc/> (<http://www.umuc.edu/ewc/>)). You can access helpful writing resources through UMUC's Effective Writing Center (EWC). The EWC provides excellent information for improving your writing skills, writing a paper, incorporating citation formats, and many other writing skills.

1. The Research Assignment Calculator for Time management of your research papers. <http://prospero.umuc.edu/calculator/calculator.shtml> (<http://prospero.umuc.edu/calculator/calculator.shtml>)

C. Library Guide for the Sciences

The UMUC library has developed resources to aid in research of science related databases, Websites, books, and e-books. The Library Services site also provides information on how to find articles, and 24-hour access to UMUC librarians. The link to the Library Guide can be found at <http://libguides.umuc.edu/science> (<http://libguides.umuc.edu/science>).

D. Additional Academic Support

1. **First Online Course?** If this is your first time taking a UMUC online course, then you need to become familiar with navigating around online learning environment by navigating through the various parts of our classroom to see all that is available.

2. Tips for Success

- Get books and materials before the semester begins
- Login to online classroom before the semester begins
- Begin the course work on time and early (in the first 1-2 days of the semester)
- Start weekly assignments early in the week (Do not wait until 1-2 days before they are due)
- Check the online classroom, classroom messages and announcements, and your email every 1-2 days for new information
 - Complete orientation (if new online college student)
 - View and print the syllabus and mark calendar with important course dates
 - Read start-up/orientation materials posted by faculty member

3. Student Participation Expectations

1. Time Commitment:

Now that you have read the Syllabus, you should recognize that this course requires **active student participation**. An on-line course requires you to put in at least the same amount of time as an in-classroom course. For an eight-week course, you should expect to spend at least six hours per week participating in class discussions and activities and then about 12-15 hours in study, assigned reading, and preparing assignments outside of class. Active participation is required in all online courses, and you should expect to log in to your online course several times a week.

2. Study and Work Habits:

Summing Up a Successful Online Student. An online course places more responsibility on the student (and subsequently more independence) than a face-to-face course. Therefore, **a successful online student must exercise more self-discipline than a face-to-face student**. A successful online student is one who:

- reads the Course Schedule's assigned reading material thoroughly before responding in a conference
- prepares personal study notes (like classroom notes) each week from the reading assignment addressing key points, key figures, and defines any bold-faced terms
- considers outlining the course material for personal study
- participates two-to-three times per week in conferences and avoids late week conference comments
- engages the material and others with enthusiasm and courtesy
- schedules adequate time to do the work
- asks for help when needed
- interacts with others in the class
- is self-motivated
- turns in well-drafted, proofed, and properly cited and referenced assignments prior to their due dates
- keeps copies of all work and instructor responses in case of an emergency

GRADING INFORMATION

You are responsible for the following graded items:

Conference Work	7% (1% per week for 7 weeks)
Lab Activities	77% (11% each for 7 labs)
Final Applied Project	16%

Total	100%
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The grading scale is as follows:

A	90% - 100%
B	80% - 89%
C	70% - 79%
D	60% - 69%
F	0% - 59%

Mathematics in this Course

Math (at the level of MATH 012) is used in this course. Mathematics is the language of the physical sciences and is an essential part of this course. Examples in the course materials should be studied carefully.

Extra Credit

There is no opportunity for "extra credit" in this course.

Late Policy

Illness, death, family emergency situations, and TDYs (for military members) are part of our lives.

If a situation arises during the term that interferes with your coursework, it is your responsibility to contact your instructor as soon as reasonably possible. Failure to stay in contact, reply to instructor email (or messages), or to resume active course participation, may result in your late work not being accepted. Every situation is different and your instructor will try to do what is in the best interest of the student.

In most cases, some sort of accommodation can be made that will allow you to continue and complete the course, but your instructor must know what is going on and must hear about difficulties before any deadlines are reached, let alone passed.

Conference Discussions and Laboratory Activities

In this course, you will be expected to participate in conference discussions and complete online lab activities. All discussions relate to the core concepts and skills addressed by the lab activities. Each lab activity is designed to enable the student to employ aspects of the scientific method in order to verify or explore the basic principles of physical science. You will be expected to carry out lab activities as directed.

Weekly Conferences and Main Topic Postings

- To be successful in this course you must master the concepts in the conference discussions.
- In this course, Conference Main Topics are assigned to the class as a whole.
- Conference Main Topic postings are due by 11:59 PM Saturday night.
- You are required to participate/post in at least **one** Main Topic each Week.
- Do **not** directly copy a response from the textbook or from the Internet. Use your own words.

Always adhere to the general rules of online etiquette. It's important to follow the guidelines of proper online etiquette to ensure good communication between you, your classmates and your instructors. Keep the five online etiquette tips below in mind during your online course:

1. **Respect.** Whether the class is online or on-site, respect is essential. It allows all involved parties to focus on the objective and prevents distracting disagreements. Be sure to use a polite tone, read before responding and be constructive with your criticism. It's important to treat all online interactions the same as face-to-face interactions.
2. **Use Proper Formatting, Punctuation and Grammar.** The same rules of English apply in the online classroom setting. Capitalize letters when necessary, use appropriate punctuation and avoid using slang and abbreviations. You'll not only make your posts easier to read; you'll demonstrate your professionalism and personal value.
3. **Be Careful.** Because tone is difficult to convey online, sarcasm or humor can easily be misinterpreted. Though you may be tempted to joke around with your classmates, something written for a laugh may offend others. If you are unsure whether your message will be misconstrued, consider using an emoticon to lighten the tone.
4. **Go to Your Instructor First.** If you have a disagreement or issue with a fellow classmate, go to your instructor before the situation escalates. It's best to make your instructor aware of the situation before it affects the classroom dynamics or the way you engage with your peers.
5. **Stay on Topic, and Keep it Brief.** Online classes require a lot of reading, and when responding, it may be difficult to decide where to start. Focus your comments into short topics to keep the conversation flowing. Avoid being too wordy, and instead say what you need to say without veering off topic.

Any response that is intimidating, disrespectful, belittling, and/or demeaning will not be tolerated and will be deleted.

Required Lab Software

This course uses *Physical Science Lab Activities* from TableTop Science (www.tabletopscience.com (<http://www.tabletopscience.com/>) TTS code: UMUCPHYSCI). You are required to use this software package to complete your lab activities.

Lab Software Technology Requirements

- An active email address is necessary for registration and sign-in purposes
- Internet access and a modern web browser are required
 - Internet access is needed for sign-in and proper functioning of lab activities
 - Recommended Modern Browsers: *Google Chrome*, *Mozilla Firefox*, and *Safari* — Microsoft browsers are not recommended at this time
- Ability to open/edit/save Lab Activity Form documents (.docx file format)
 - Examples of compatible software include: *Microsoft Word*, *Pages*, and *LibreOffice* (a free and open source office suite)
- Laptop, desktop, or tablet computer - smart-phone screens will most likely be too small for useful work

Data Plots and Identifying Information

For many lab activities, the software used for this course produces graphical data as images. These data plots contain useful information necessary to complete your work — and they also include identifying information about the user. Your name, the time and date, and general location (e.g. city, state, zip code, country) may be included on such plots. Your instructor will provide guidance with regard to the number of data plots you should submit along with your completed Activity Form.

Additionally, you should be prepared to provide screen-shots if requested by your instructor. On the Macintosh use Command-Shift-4 to capture a portion of the screen; the image will be saved to the desktop. On IBM-PC clones (the PC), use CTRL-ALT-PrstScrn to capture an image into the memory and then paste it into word document.

Activity Forms and Supporting Documents

Completed Activity Forms and any supporting documents (i.e. required data plots or screen-shots) are due on the day posted in the schedule at the end of this syllabus. If you think you will be unavailable when the lab is due, submit your work early to get full credit.

Overview of Lab Activities

Important: Please note the time required to complete each activity. The listed time should be considered the *minimum* amount of time needed for a well prepared student. It is *very* likely that you will find these activities challenging! Occasionally, you may need to repeat or redo a portion of your work. Please plan your schedule accordingly and remember that you must conduct the experiment as well as prepare answers to questions that might require additional reading or research. If possible, it is always a good idea to get an early start.

Steps for Success: Students should follow the steps below to successfully complete a lab activity.

1. Prepare:
 - Carefully read through any information, instructions, and/or other materials provided by your instructor
 - Complete any required preliminary activities (i.e. conference/discussion work and/or associated readings)
 - Read through the background material provided in the lab itself (i.e. see the **Background** tab)
2. Gather Data:
 - Carefully read through and follow the steps laid out in the lab procedure (i.e. see the **Procedure** tab)
 - Be certain to record your **Activity Data Code**, and your data, on the provided Activity Form (look under the **Activity Form** tab)
 - Save data plots as required or requested by your instructor
3. Analysis and Results:
 - Use the background material provided in the lab, classroom materials, and your collected data and/or data plots to complete your Activity Form
 - Be certain to fill in all tables and answer all questions — revisit and redo portions of the activity if necessary
 - Ask your instructor for guidance if you get stuck or are uncertain on how to proceed
4. Submit your completed Activity Form and any other supporting documents to the appropriate Assignments Folder

Lab Activity 1: Motion and Forces

Time: 2 hours

Concepts Explored: motion, vectors, position, velocity, acceleration, forces, free body diagrams, equilibrium, Newton's laws of motion, coefficient of friction, interpretation of graphical data.

Experiment: Students explore motion and forces by dragging blocks of different materials across a surface. The coefficients of static and kinetic friction are determined for each material.

Lab Activity 2: Conservation of Energy

Time: 2 hours

Concepts Explored: energy, conservation of energy, mechanical energy, kinetic energy, potential energy, coefficient of restitution, interpretation of graphical data.

Experiment: Students explore energy concepts by launching elastic, and semi-elastic, balls from compressed springs. Spring constants, velocities, heights, and coefficients of restitution are determined.

Lab Activity 3: Heat Transfer

Time: 2 hours

Concepts Explored: temperature, internal energy, heat transfer, thermal equilibrium, specific heat capacity, calorimetry, interpretation of graphical data.

Experiment: Students explore heat transfer for a handful of substances. Calorimetry is used to determine the specific heat capacity of the materials.

Lab Activity 4: Lenses and Mirrors

Time: 2 hours

Concepts Explored: converging and diverging lenses, real image formation using converging lenses, converging and diverging mirrors, real image formation using converging mirrors, magnification, lens/mirror equation, interpretation of data.

Experiment: Students explore how real images are formed using lenses and mirrors. Focal distances for a lens and mirror are determined from object and image distances.

Lab Activity 5: Radioactive Decay

Time: 2 hours

Concepts Explored: atoms, isotopes, elements, types of radiation, decay rate, inverse square law, experimentally identifying radiation, radioactive half-life, methods of determining half-life, slope of line, interpretation of graphical data.

Experiment: Students explore radioactive decay. The type of radiation and half-life are determined for different radioactive samples.

Lab Activity 6: Heat of Reaction

Time: 2 hours

Concepts Explored: chemical reactions, exothermic reaction, endothermic reaction, heat of reaction, enthalpy, temperature, internal energy, heat transfer, specific heat capacity, calorimetry, density, moles, molar concentration, interpretation of graphical data.

Experiment: Students explore heat transfer in chemical reactions. Heat of reaction per mole (enthalpy per mole) is determined for two different reactions. An optional extension allows gas volume determination via the ideal gas law.

Lab Activity 7: Acids and Bases

Time: 2 hours

Concepts Explored: acids, bases, pH, acid and base aqueous solutions, strong acid-base reactions, moles, molar concentration, determining concentration using an acid-base reaction, titration curve, interpretation of graphical data.

Experiment: Students explore strong acid-base reactions and the pH of solutions. The concentrations of two strong acid solutions are determined.

Final Applied Project

As a culminating assessment in this laboratory course, you will complete a final applied project. Your final applied project will emphasize experimental design and the scientific method. The project will be a research plan that you construct for a specific issue related to the physical sciences. This research plan should be about 1-2 pages in length.

During or at the end of the last week of the term, you will submit the research plan to the Assignments Folder for grading. At two earlier times during the term, your instructor will interact with you on specific parts of the project. At the end of week 3, you should submit Part 1 to your instructor for approval. At the end of week 5, you should submit Part 2 to your instructor for approval. No grades are assigned for these earlier submissions; only the final research plan, Part 3, will be graded and counted towards your course grade.

There are three main steps necessary for completion of the final applied project:

Part 1: Selection of a problem to study and an initial hypothesis.

- Select an issue/problem/topic from one of the physical sciences: physics, chemistry, earth science, or astronomy.
- Propose an initial hypothesis related to the issue.

Part 2: Review current research knowledge.

- Describe how you could perform a review of current research on the subject/issue. Identify which UMUC Library/database sources could be useful in your research review. What criteria will you use in the selection of review sources from the web?
- Do the results of your research review lead you to suspect that your initial hypothesis is correct, or does it suggest that you should modify your initial hypothesis in some way? If so, restate or revise. Are there gaps in the current research that further research/experimentation/observation might fill and shed light on your hypothesis?

Part 3: Write a research plan based on the results of parts 1 and 2 above.

- Suggest a plan to test your hypothesis (initial or revised). What data will you study? How and where will you gather it? What equipment or resources will be needed? How much time will be needed to gather the data? Are there any confounding issues that might affect/influence the quality of your data? If so, discuss how might you mitigate these unwanted effects/influences? Justify all of your statements.
- Provide a list of UMUC sources that could be used to review this issue. Include a citation of one article you read.
- Provide a list of web sources that could be used to review this issue. Discuss why these web sources would be trusted sources of information on the issue. Include a citation of one site you reviewed.
- Suggest how your data would be presented (chart, graph, or table).

ACADEMIC POLICIES

Academic Policies and Guidelines

ACADEMIC INTEGRITY

As a member of the University of Maryland University College (UMUC) academic community that honors integrity and respect for others you are expected to maintain a high level of personal integrity in your academic work at all times. Your work should be original and must not be reused in other courses.

CLASSROOM CIVILITY

Students are expected to work together cooperatively, and treat fellow students and faculty with respect, showing professionalism and courtesy in all interactions. Please review the Code of Civility for more guidance on interacting in UMUC classrooms: <https://www.umuc.edu/students/support/studentlife/conduct/code.cfm> (<https://www.umuc.edu/students/support/studentlife/conduct/code.cfm>).

POLICIES AND PROCEDURES

UMUC is committed to ensuring that all individuals are treated equally according to Policy 040.30 Affirmative Action, Equal Opportunity, and Sexual Harassment (<https://www.umuc.edu/policies/adminpolicies/admin04030.cfm>).

Students with disabilities who need accommodations in a course are encouraged to contact the Office of Accessibility Services (OAS) at accessibilityservices@umuc.edu (<mailto:accessibilityservices@umuc.edu>), or call 800-888-UMUC (8682) or 240-684-2287.

The following academic policies and procedures apply to this course and your studies at UMUC.

- 150.25 Academic Dishonesty and Plagiarism (<https://www.umuc.edu/policies/academicpolicies/aa15025.cfm>) – UMUC defines academic dishonesty as the failure to maintain academic integrity. All charges of academic dishonesty will be brought in accordance with this Policy.

Note: Your instructor may use **Turnitin.com**, an educational tool that helps identify and prevent plagiarism from Internet resources, by requiring you to submit assignments electronically. To learn more about the tool and options regarding the storage of your assignment in the Turnitin database go to: <https://www.umuc.edu/library/libresources/turnitin.cfm> (<https://www.umuc.edu/library/libresources/turnitin.cfm>).

- 151.00 Code of Student Conduct (<https://www.umuc.edu/policies/studentpolicies/stud15100.cfm>)

The following policies describe the requirements for the award of each degree:

Degree Completion Requirements for the Graduate School (<https://www.umuc.edu/policies/academicpolicies/aa17040.cfm>)

- 170.40 Degree Completion Requirements for a Bachelor's Degree (<https://www.umuc.edu/policies/academicpolicies/aa17041.cfm>)

- 170.41 Degree Completion Requirements for an Associate's Degree (<https://www.umuc.edu/policies/academicpolicies/aa17042.cfm>)

- 170.42

- 170.71 Policy on Grade of Incomplete (<https://www.umuc.edu/policies/academicpolicies/aa17071.cfm>) - The mark of I is exceptional and considered only for certain courses. Students who have completed 60% of their coursework with a grade of B or better for graduate courses or C or better for undergraduate courses and request an I before the end of the term. The mark of I is not available for noncredit courses.
- 170.72 Course Withdrawal Policy (<https://www.umuc.edu/policies/academicpolicies/aa17072.cfm>) - Students must follow drop and withdrawal procedures and deadlines available at <https://www.umuc.edu/> (<https://www.umuc.edu/>) under Academic Calendar.
- 130.80 Procedures for Review of Alleged Arbitrary and Capricious Grading (<https://www.umuc.edu/policies/academicpolicies/aa13080.cfm>) – appeals may be made on final course grades as described herein.
- 205.06 Calculation Of Grade-Point Average (GPA) for Inclusion on Transcripts and Transcript Requests (<https://www.umuc.edu/policies/academicpolicies/aa20506.cfm>) – Note: Undergraduate and Graduate Schools have different Grading Policies (i.e. The Graduate School does not award the grade of D). See Course Syllabus for Grading Policies.

GRADING

According to UMUC's grading policy, the following marks are used:

	Undergraduate	Graduate
A	90-100	90-100
B	80-89	80-89
C	70-79	70-79*
D	60-69	N/A**
F	59 or below	69 or below
FN	Failure-Non attendance	Failure-Non attendance
G	Grade Pending	Grade Pending
P	Passing	Passing
S	Satisfactory	Satisfactory
U	Unsatisfactory	Unsatisfactory
I	Incomplete	Incomplete
AU	Audit	Audit
W	Withdrew	Withdrew

* The grade of "B" represents the benchmark for The Graduate School. Students must maintain a Grade Point Average (GPA) of 3.0 or higher. Classes where final grade of C or F places a student on Academic Probation must be repeated.

** The Graduate School does not award the grade of D.

COURSE EVALUATION SURVEY

UMUC values its students' feedback. You will be asked to complete an online evaluation toward the end of the term. The primary purpose of this evaluation process is to assess the effectiveness of classroom instruction in order to provide the best learning experience possible and make continuous improvements to every class. Responses are kept confidential. Please take full advantage of this opportunity to provide your feedback.

LIBRARY SUPPORT

Extensive library resources and services are available online, 24 hours a day, seven days a week at <https://www.umuc.edu/library/index.cfm> (<https://www.umuc.edu/library/index.cfm>) to support you in your studies. The UMUC Library provides research assistance in creating search strategies, selecting relevant databases, and evaluating and citing resources in a variety of formats via its Ask a Librarian service at <https://www.umuc.edu/library/libask/index.cfm> (<https://www.umuc.edu/library/libask/index.cfm>).

EXTERNAL LINK DISCLAIMER

This course may contain links to external sites neither owned nor maintained by UMUC. UMUC bears no responsibility for the accuracy, legality, or content of external sites or for that of subsequent links. In addition, the terms of use, security policies, and privacy policies may differ from those of UMUC. Contact the external site for answers to questions regarding its content, terms of use, and policies.

LEARNING MANAGEMENT SYSTEM SUPPORT

To successfully navigate the online classroom new students are encouraged to view the Classroom Walkthrough under Help in the upper right menu of the LEO classroom. Those requiring technical assistance can access Help@UMUC Support directly in LEO under the Help menu. Additional technical support is available 24 hours a day, seven days a week via self-help and live chat at <https://www.umuc.edu/help> (<https://www.umuc.edu/help>) or by phone toll-free at 888-360-UMUC (8682).

SYLLABUS CHANGES

All items on this syllabus are subject to change at the discretion of the Instructor and the Office of Academic Affairs.

CLASS & ASSIGNMENT SCHEDULE

Week/Date	Assignments
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Week 1 Oct 23 to Oct 29	Read: Course Module 1: The Physical Sciences and the Scientific Method • The Sciences • The Scientific Method • Controls and Variables • Models Course Module 2: Physics • Mass, Weight, and Motion Concepts of Chemistry: 1.3-1.7 Concepts of Physics: 1.1-1.2, 2.1-2.4, 3.1-3.6 Do: Conference Discussions Lab Activity 1: Motion and Forces
Week 2 Oct 30 to Nov 5	Read: Course Module 2: Physics • Energy Concepts of Physics: 4.1-4.5 Do: Conference Discussions Lab Activity 2: Conservation of Energy
Week 3 Nov 6 to Nov 12	Read: Course Module 2: Physics • Heat and Heat Transfer Concepts of Physics: 6.1, 6.3-6.5 Do: Conference Discussions Final Applied Project Part 1 Lab Activity 3: Heat Transfer

Week 4 Nov 13 to Nov 19	Read: Course Module 2: Physics • Sound and Light Waves Concepts of Physics: 9.9-9.11, 9.14-9.15 Do: Conference Discussions Lab Activity 4: Lenses and Mirrors
Week 5 Nov 20 to Nov 26	Read: Course Module 3: Chemistry • Atoms Concepts of Physics: 10.4-10.7 Do: Conference Discussions Final Applied Project Part 2 Lab Activity 5: Radioactive Decay
Week 6 Nov 27 to Dec 3	Read: Course Module 2: Physics • Heat and Heat Transfer Course Module 3: Chemistry • The Periodic Table • Chemical Bonding and Molecules • Reactions and Chemical Equations • Chemical Energy and Chemical Equilibrium Concepts of Chemistry: 6.1-6.5, 9.2, 7.1-7.7 Concepts of Physics: 6.1, 6.3-6.5, 6.7. 5.2 Do: Conference Discussions Lab Activity 6: Heat of Reaction

Week 7 Dec 4 to Dec 10	Read: Course Module 3: Chemistry • Electrolytes, Acids, and Bases Concepts of Chemistry: 6.1-6.5, 9.2, 10.1-10.7 Do: Conference Discussions Lab Activity 7: Acids and Bases
Week 8 Dec 11 to Dec 17	Do: Final Applied Project Part 3: Integrated Research Plan