

## PHYSICS 100      Exploring the Physical World      Summer 2020

**Instructor:** Prof. Nadine Gergel-Hackett (Prof. G)

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### **Course Description:**

The primary goal of this course is to learn about the natural world through studying the foundational principles of chemistry and physics. The topics studied are appropriate for persons of all backgrounds and experience. In addition to exposure to basic scientific principles in a real-world context, students will gain experience with the scientific process and problem-solving skills. Students will learn through reading the text and lecture slides, discussions, problem solving, and hands-on investigations. This course counts as both 'N' and 'Q' common curriculum credit.

**Objectives:** By the end of the course, students will be able to:

- Understand and use chemistry and physics terms to describe the world around them
- Apply foundational equations to explain chemistry and physics principles
- Solve real-world math problems using dimensional analysis (i.e., converting units), translating word problems into algebraic equations, and solving algebraic equations
- Represent data using graphs, including using graphing software such as Excel or Google Sheets
- Work in groups to problem solve and follow instructions to collect and analyze data in hands-on activities

### **Materials:**

- Text, *THE SCIENCES: AN INTEGRATED APPROACH*, by James Trefil and Robert M. Hazen, 6<sup>th</sup> Edition
- Scientific calculator with capabilities such as this model: [scientific calculator on Amazon](#). Or, a *scientific calculator* phone app
- An additional list of materials required for completing the hands-on investigations (with links to suppliers) is included in the instructions for your first assignment. The estimated cost of these materials is around \$50 total, depending what you have at home and where you purchase them.
- Access to a computer with internet, access to camera (e.g., phone camera) or scanner if you don't have a camera/phone that will take readable photos of hand-written work for submission
- Access to a Google account (free) to use Google Docs, Sheets, and Slides

### **Honor Code:**

Mary Baldwin follows an honor code that all MBU students pledge to uphold and that you will be expected to adhere to in class. You can find the honor code and a link to file infraction reports here:

<https://go.marybaldwin.edu/student/sga/honorcode/>. Please always ask me if you are ever unsure about how the honor code applies to individual assignments.

### **Learning Accommodations:**

If you believe that you may have circumstances that require course accommodations, please contact Dr. Jenny Joczik, Director, Academic Resource Center, [vjoczik@marybaldwin.edu](mailto:vjoczik@marybaldwin.edu) for consideration of specific course accommodations.

## Course Structure:

### Weekly Reading:

The reading assignment for each week is listed in the tentative schedule at the end of this syllabus.

### Weekly Lecture Notes:

Course modules are organized by week. Each week's module (e.g., "Week 1 Materials and Assignments" listed on left in Blackboard) contains at least one set of slides summarizing the material and providing additional details and examples. These slides are the lecture notes for the course. Each week, you should first read the weekly reading assignment (listed in the table at the end of this syllabus) and then read through the lecture slides. Throughout the lecture slides are example problems. When you get to an example problem in the slides, please work the problem completely on paper prior to clicking to the following slide (which shows the answer for the problem worked out). Practicing problems through these examples is key to understanding the material, so please work each one carefully. The slides also have video tutorials linked throughout. These tutorials show me working through example problems, so please also watch all video tutorials. If you are having problems working an example, watch the video tutorial and try again (and then contact me if you still have questions).

### Weekly Assignments:

Weekly assignments including their instructions are posted in each week's module. These assignments include: homework problems that are to be answered by hand carefully showing all work and submitted to Blackboard in pdf format, hands-on investigations with results to be written out showing all work with photographs of setups as described in the instructions and submitted to Blackboard in pdf format, and online quizzes/problems. Note that there will also be prompted discussions and tests, which are not included in the weekly assignment grade. All work that is to be written out (vs. an online quiz or discussion) \*must\* be combined into \*one\* pdf and uploaded to Blackboard for submission (instructions for this will be provided).

**All regular weekly assignments are due by 11:59 pm on the Wednesday following the week they are assigned (except for the assignment for the week of July 4th, which has its deadline extended until 11:59 pm on the following Monday, July 13th). No credit will be given for any late assignments.\***

The keys to success on the assignments are to: start early in the week of when each homework set is due, allocate approximately 3-5 hrs every week for each week's assignments, work hard individually first on each assignment, seek help from other students and Prof G, and look over all of the comments and corrections on graded work shortly after it is posted to make sure you understand your errors.

### Discussion Boards:

By clicking on the "Discussions" link on Blackboard, students can access the various discussion threads for the course. Participation in discussions will be required as "Discussion" is part of your final grade. See the table "Phys 100 Tentative Spring Schedule" below for the due dates for class discussions.

**Tests:** Test questions will be taken from what is covered in the lecture notes, discussions, and investigations, and will be similar in style to homework questions. Tests will be open notes, open book, and open internet (no interpersonal communication allowed!). All test questions that are not multiple choice are to be answered by hand carefully showing all work and submitted to Blackboard in pdf format **No credit will be given for missed or late tests and there will be no makeup tests given without a substantiated medical or serious family emergency.**

### End of Semester Project:

There will be a class project that is due the last day of class. The project consists of choosing a concept that was covered in the course (either physics or chemistry) and then describing a real-world application that exemplifies the physics/chemistry concept. The student will turn in a Powerpoint or Google Slides presentation explaining the concept from class and how it is relevant to the chosen real-world application (see instructions for more details).

There will be a project that you will have the last week of the course to focus on and that is due the last day of class. The project basically consists of choosing on concept covered in the course (either physics or chemistry) and describing a real-world application of the concept. The student will turn in a few Powerpoint or Google slides explaining the concept and its real-world application and they will be graded to count as two weekly assignment grades.

**Course Tips:**

Keys for doing well in the course include: keep up with all material as we go, make sure that you understand all steps to all problems solved in class and in the homework as we go, review all class notes and investigations from the relevant topics prior to the test, and make sure that all definitions, relationships, procedures, and concepts that I have identified as important in the notes for the relevant topics are in your head by the day of the test.

**Assessment:** You can view your grade for each assignment on Blackboard. Your overall grade will be determined according to the following:

|   |   |      |               |               |
|---|---|------|---------------|---------------|
| Weekly Assignments (includes all HW and investigations combined in 1 grade/week)* | 30 points (3 pnts. ea. weekly assignment, 6 points for the final project) | 30 % | 93-100<br>A   | 73-76<br>C    |
| 3 Tests   | 30 points (10 pnts. ea. test)   | 30%  | 90 – 92<br>A- | 70-72<br>C-   |
|   |   |      | 87 – 89<br>B+ | 67 – 69<br>D+ |
| Final Exam  | 20 points   | 20%  | 83 – 86<br>B  | 63 – 66<br>D  |
| Discussion  | 20 points (5 pnts. ea. prompted reply)                                    | 20%  | 80 -82<br>B-  | 60 -62<br>D-  |
|   |   |      | 77 – 79<br>C+ | Below 60<br>F |

\* Because I expect everyone to deal with minor illness and/or other schedule conflicts at some point in the semester, at the end of the semester I will drop your one lowest weekly assignment score (note that this does not include tests!). Because of the above policy, I will not be lenient about any late or missing assignments without a substantiated medical emergency or serious family emergency. But remember, if you turn in all assignments you can still drop your lowest grade, so try to plan on submitting them all.

## Phys 100 Tentative Schedule Summer 2020

| WEEK   | MATERIAL  | Investigation (with quiz) or Discussion<br>Due the following Monday 11:59 pm, except for assignment for the week of the 4 <sup>th</sup> of July (due Mon the 13 <sup>th</sup> with the test)                                     | Homework Problems or Test<br>Due the following Monday 11:59 pm, except for the assignment for week of the 4 <sup>th</sup> of July (due Mon the 13 <sup>th</sup> with the test) |
|--|---|--|--|
| <b>Week 1</b><br>May 26 <sup>th</sup> – May 31 <sup>st</sup>   | Science as a Way of Knowing, Measurements<br><br>Read text: Chapter 1                             | <b>Prompted Discussion:</b><br>Preconceived notions about chemistry and/or physics   | HW week#1<br><b>Note that most HW has both a hand-written and online portion</b>   |
| <b>Week 2</b><br>June 1 <sup>st</sup> - 7 <sup>th</sup>        | The Atom and Elements<br><br>Read text: Chapter 8 <b>and</b> pgs 252-256                          | How Tall is Bigfoot?<br><b>Note that most investigations require a picture, a hand-written part, and online part. All pics should be combined with the hand-written parts and with the weekly HW to be submitted as one pdf.</b> | HW week#2  |
| <b>Week 3</b><br>June 8 <sup>th</sup> – 14 <sup>th</sup>       | Atoms in Combination: The Chemical Bond<br><br>Read Text Pgs: pgs 197-204                         | <b>Investigation:</b> Making a Model of an Atom  | HW week#3  |
| <b>Week 4</b><br>June 15 <sup>th</sup> - 21 <sup>st</sup>      | Structure and Properties of Materials<br><br>Read Text Pgs: 205-210 <b>and</b> Chapter 11         | None-Test Week   | <b>Take test</b> (covers concepts from weeks 1-3)  |
| <b>Week 5</b><br>June 22 <sup>nd</sup> – 28 <sup>th</sup>      | Chemical Reactions, Energy, and Heat<br><br>Read Text Pgs: Chapter. 4 <b>and</b> pgs 211-216      | <b>Prompted Discussion:</b><br>Chemical Reactions  | HW week#5  |
| <b>Week 6</b><br>June 29 <sup>th</sup> - July 5 <sup>th</sup>  | Conservation of Energy and Conservation of Mass<br><br>No reading in text, just see lecture notes | <b>Investigation:</b> Glue ball chemistry<br><b>Please note that this is not due July 8<sup>th</sup> but due with the test on July 13<sup>th</sup></b>   | HW week#6<br><b>Please note that this is Not due July 8<sup>th</sup> but due with test on July 13<sup>th</sup></b>   |
| <b>Week 7</b><br>July 6 <sup>th</sup> - July 12 <sup>th</sup>  | Physics! Conservation of mechanical energy<br><br>Read Text: pgs 53-55                            | None-Test Week<br><b>(due the 15<sup>th</sup> along with the previous week's assignment)</b>   | <b>Take test</b> (covers Concepts from weeks 4-6)<br><b>(due the 15<sup>th</sup> along with the previous week's assignment)</b>  |
| <b>Week 8</b><br>July 13 <sup>th</sup> – July 19 <sup>th</sup> | Conservation of mechanical energy, contd  | <b>Prompted Discussion:</b><br>Conservation of mechanical energy   | HW week#8  |
| <b>Week 9</b><br>July 20 <sup>th</sup> - 26 <sup>th</sup>      | Linear Motion<br><br>Read text: pgs 31-36   | <b>Investigation:</b> Glue ball physics  | HW week#9  |

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| <b>Week 10</b><br>July 27th –<br>Aug 2 <sup>nd</sup>           | Force, Work, and Simple Machines<br>Read text pgs: 37-39 and 49-52   | None-test week   | <b>Take Test</b><br>(covers concepts<br>from weeks 7-10)    |
| <b>Week 11</b><br>August 3 <sup>rd</sup><br>-9 <sup>th</sup>   | Waves and electromagnetic radiation<br>Read: Chapter 6   | <b>Prompted Discussion:</b><br>Electromagnetic Radiation | HW #11  |
| <b>Week 12</b><br>August 10 <sup>th</sup><br>-14 <sup>th</sup> | Projects: Applications of Physical Science<br><b>Comprehensive final exam and projects are due Friday, August 14<sup>th</sup> by 11:59 pm!</b> | None-work on Projects and<br>final exam                  | <b>Projects due<br/> and final exam due on<br/> Friday!</b> |