

CHEM 111.02 .
Introductory Chemistry I
Fall 2017

INSTRUCTOR

Michael S. Elioff, PhD
office: Caputo Hall 320
phone: 717-871-2040
email: melioff@millersville.edu

OFFICE HOURS

Monday: 8:00 – 9:00 am; Tuesday & Thursday: 10:40 am – 12:40 pm

LECTURES

Tuesday & Thursday 9:25 – 10:40 am; RODDY 149

RECITATION & LABORATORY

A: Monday 9:00 – 9:50 am RODDY 153; 10:00 – 11:50 am CAPUTO 328
B: Monday 1:00 – 1:50 pm RODDY 153; 2:00 – 3:50 pm CAPUTO 328
C: Thursday 5:00 – 5:50 pm RODDY 153; 6:00 – 7:50 pm CAPUTO 328

COURSE TEXTBOOK

Chemistry, 10th edition, by Steven S. Zumdahl, Susan A. Zumdahl, and Donald J. LaCoste; Brooks/Cole publishers, 2016; ISBN-13: 978-1305957404

LABORATORY MANUAL

No purchase will be required. Instructions for laboratory exercises have been posted to the Desire2Learn website. Print them out and read them before lab.

SUPPLEMENTAL MATERIAL

Photocopied handouts may be provided when appropriate. Calculator with root function, logs, and antilogs will be required for exams and homework. Some cheap calculators that work well are the Casio FX250HC, the Sharp 501WBBL, and the Texas Instruments TI30X. All these calculators are available for less than ten dollars. *Required for lab:* Safety goggles and shoes.

COURSE CONTENT:

Chemistry has been called the most “central” science since topics discussed in chemistry find relevance in biology, physics, medicine, law, economics, ecology, materials science, environmental studies, and geology. Chemistry is the study of matter, and matter is anything that takes up space and has non-zero rest mass. Therefore, chemical understanding is central to scientific wisdom. General Chemistry I covers, broadly, chapters 1 through 11 of the textbook. We will define chemistry, distinguish between chemical and physical processes, and introduce some simple chemical concepts. Next semester we will continue to examine important concepts in chemistry.

At Millersville University the two semesters of freshman chemistry are numbered CHEM 111 and CHEM 112. The general outline of coverage for each semester is:

CHEM 111

- Chapter 1: Chemical foundations
- Chapter 2: Atoms, molecules, and ions
- Chapter 3: Stoichiometry
- Chapter 4: Chemical reactions & solution chemistry
- Chapter 5: Gases & gas laws
- Chapter 6: Thermochemistry
- Chapter 7: Periodicity & electronic structure
- Chapter 8: Bonding: general concepts
- Chapter 9: Bonding: orbitals
- Chapter 10: Liquids and solids
- Chapter 11: Solutions

CHEM 112

- Chapter 12: Chemical kinetics
- Chapter 19: Nuclear chemistry
- Chapter 13: Chemical equilibrium
- Chapter 14: Acid-base chemistry
- Chapter 15: Equilibria in acid-base solutions
- Chapter 16: Solubility and precipitation equilibria
- Chapter 17: Thermodynamic Spontaneity
- Chapter 18: Electrochemistry
- Chapter 20: Representative elements
- Chapter 21: Chemistry of transition metals (as time permits)

COURSE OBJECTIVES

1. To introduce to the student the principles, laws, and theories of chemistry.
2. To provide the student with a theoretical and empirical understanding of the principles, laws and theories of chemistry.
3. To develop in the student the ability to think critically and to solve quantitative chemical problems and to promote original thought on the part of the student and encourage the use of logic in the solution of problems.
4. To develop an ability in the student to learn and work independently as well as learning and working with a team of peers.
5. To illustrate, in a laboratory setting, the fundamental laws of chemistry.
6. To develop in the student an appreciation for laboratory safety and environmental sensitivity.

GRADING

Grading will be as follows: A 1000-point scale will be used to determine the final grade. The lecture portion of the course is worth 75% of the overall grade and the lab portion is worth 25%. For the lecture portion of the course, there will be four

ON-LINE COMPONENTS

Approximately ten assessments will be administered using the Desire2Learn software. Be sure to log on at <https://wiki.millersville.edu/display/d2ldocs/Home> very soon after the first class meeting. Be sure to follow all instructions for submitting assessments. Pay close attention to the due dates.

LABWORK

Data Sheets (Reports): Your completed data sheets are due at the end of each class. All data sheets are graded on a fourteen-point basis. You will be graded on the precision of your answers and how completely you answer the questions.

INSTRUCTIONS FOR LABORATORY EXERCISES

Please arrive on time, as you will not be given extra time to finish the experiment beyond the designated time. *Please read the experiment before coming to lab.* You will have an idea about what to expect in the laboratory and you will feel more comfortable with the experiment. It is never a good idea to read the experiment, for the first time, as you are performing the laboratory exercise. In order to motivate your lab preparation, each lab meeting will begin with a quiz.

Data sheets with complete calculations are due at the conclusion of each lab. It is expected that all students will complete all laboratory exercises, and all labs will count toward the final lab grade as described above.

ATTENDANCE

General chemistry concepts require a mathematical framework for their presentation. Concepts are cumulative in the sense that the student must master introductory concepts and derivations in order to fully understand more advanced topics in general chemistry. We will continue to build upon material mastered earlier, hence poor attendance will affect your class grade. *Attendance is necessary in all lab meetings. If you cannot attend lab, due to illness or other emergency, you must contact me before the class period, or as soon thereafter as possible.* The last day to drop this course without penalty is November 2. See <http://www.millersville.edu/registrar/academic-calendar/> for important dates.

DISABILITY STATEMENT

It is the responsibility of students who have professionally diagnosed disabilities to notify the instructor so that appropriate modifications can be made to meet any special learning needs. Specific questions should be directed to the Office of Learning Services, at 717-872-3178.

ACADEMIC DISHONESTY

Academic dishonesty includes unfairly advancing one's own academic performance or the performance of another, as well as intentionally limiting the academic performance of another student. Penalties for academic dishonesty will depend on the situation, ranging from a zero grade for the exam or assignment, to course failure. Your university's accreditation is based, in part, on academic standards of excellence. Academic dishonesty will devalue your degree.

Fall 2017 Tentative Examination Schedule (subject to change):

<u>Day</u>	<u>Date</u>	<u>Topic</u>
Thur	September 14	Chapters 1 – 2
Thur	October 5	Chapters 3 – 4
Thur	October 26	Chapters 5 – 6
Tues	November 21	Chapters 7 – 9

Final exam over chapters 1 – 11: Wednesday, December 13, 2:45 – 4:45 pm

Fall 2017 Tentative Lab Schedule for Monday sections (A&B):

August 28 – Call roll. Discuss syllabus. Discuss laboratory safety. Glassware and equipment identification. Check into lockers.

September 4 – Labor Day Holiday. No experiments this week.

September 11 – Composition of a Hydrate. (exp2) The student will be introduced to hydrates and will determine the amount of water in a hydrate. The student will then use this experimental data to determine the chemical formula of an unknown hydrate.

September 18 – Identification of Common Chemicals (exp6). The student will gain experience in a variety of useful laboratory techniques.

September 25 – Continuation of Identification of Common Chemicals, continued.

October 2 – Titration of Acids and Bases (exp7, part B). The student will gain experience in standardization of a titrant as well as using titration to determine the molarity of an analyte.

October 9 – Fall recess; no lab exercises scheduled.

October 16 – Gravimetric and Volumetric Analysis (exp8, parts A&B). The student will learn about gravimetric analysis and volumetric analysis.

October 23 – Continuation of Gravimetric and Volumetric Analysis (exp8, part C).

October 30 – Evaluation of the Gas Law Constant (exp19). The students will observe the collection of a gas by displacement of water and determine the value of the gas constant.

November 6 – Thermochemistry: The Heat of Reaction (exp11). The student will measure the enthalpy change in an acid/base reaction.

November 13 – Spectrophotometric Analysis of Commercial Aspirin (exp12). The student will use ultraviolet/visible spectroscopy to determine the percentage of acetylsalicylic acid in commercially available aspirin tablets.

November 20 – Spectrophotometric Analysis of Commercial Aspirin, continued.

November 27 – Molecular models and bonding (exp13).

December 4 – Gas Laws (exp9 with modification). Students will use LoggerPro software and syringes to explore the relationships between P, V, and T.

December 11 – Laboratory practicum (pp. 57 – 64) and checkout.

Fall 2017 Tentative Lab Schedule for Thursday Section (C):

August 31 – Call roll. Discuss syllabus. Discuss laboratory safety. Glassware and equipment identification. Check into lockers.

September 7 – Composition of a Hydrate. (exp2, part A) The student will be introduced to hydrates and will determine the amount of water in a hydrate.

September 14 – Composition of a Hydrate. (exp2, part B) The student will collect and use experimental data to determine the formula of an unknown hydrate.

September 21 – Identification of Common Chemicals (exp6). The student will gain experience in a variety of useful laboratory techniques.

September 28 – Continuation of Identification of Common Chemicals, continued.

October 5 – Titration of Acids and Bases (exp7, part B). The student will gain experience in standardization of a titrant as well as using titration to determine the molarity of an analyte.

October 12 – Gravimetric and Volumetric Analysis (exp8, parts A&B). The student will learn about gravimetric analysis and volumetric analysis.

October 19 – Continuation of Gravimetric and Volumetric Analysis (exp8, part C).

October 26 – Evaluation of the Gas Law Constant (exp10). The students will observe the collection of a gas by displacement of water and determine the value of the gas constant.

November 2 – Thermochemistry: The Heat of Reaction (exp11). The student will measure the enthalpy change in an acid/base reaction.

November 9 – Spectrophotometric Analysis of Commercial Aspirin (exp12). The student will use ultraviolet/visible spectroscopy to determine the percentage of acetylsalicylic acid in commercially available aspirin tablets.

November 16 – Spectrophotometric Analysis of Commercial Aspirin, continued.

November 23 – Thanksgiving Holiday. No labs scheduled.

November 30 – Molecular models and bonding (exp13).

December 7 – Laboratory practicum (exp6) and checkout.