Michigan Technological University Chemistry Department’s Syllabus
1400 Townsend Drive
Houghton, Michigan 49931-1295
www.chemistry.mtu.edu

1. Course Number, Title, Semester, and Year.

CH1000 Preparatory Chemistry I (3), Fall, 2004.
Preparatory Chemistry Fundamental principles, laws, and theories of chemistry for students who have not
taken high school chemistry, but who have one unit of high school algebra or equivalent.

2. Instructors, Address, Telephone Number, and Office Hours.

Course Lecturer: Rudy Luck, 19-701b, (487-2309)
rluck@mtu.edu
Office Hours: M 2:00 PM - 3:00 PM
W 2:00 PM - 3:00 PM
F 2:00 PM - 3:00 PM

Learning Center Coordinator: Lois Blau, 19-206A, (487-2297)
labau@mtu.edu

3. Purpose of this Syllabus.

Welcome to Preparatory Chemistry. This syllabus outlines the content of the course and contains the rules
and regulations by which your performance will be assessed. It is important that you spend some time reading this
in order to understand how the course is graded and when assignments are due. Furthermore, by having this detailed
description of the course, you are in a position to read the relevant chapters in advance of the discussion of material
in the lectures. This is helpful for a thorough comprehension of the course and it also helps you to comprehend the
material faster and not be lost during the lectures. You should also do the examples as they occur throughout each
chapter. Use a sheet of paper to block out the solutions and then immediately verify your answer. Then try the
practice exercises.

4. Introduction.

A general introduction to chemistry, which begins with the scientific method, and includes the structure of
the atom, chemical calculations and a study of the composition of materials, their structures and properties, and
related energy conversions. This course builds a sound foundation of vocabulary and conceptual knowledge in
chemistry and this course should improve your quantitative and computing skills. Students taking the course will
attain an appreciation of atomic and molecular structure, the mole, chemical reactivity, valence and other common
concepts. The course will also demonstrate the applicability of scientific concepts and thinking processes to
significant current issues in science. The course consists of three fifty-minute lectures per week. It is important to
know that the course website is at http://www.chemistry.mtu.edu/~rluck/courses/full2004/PrepChem/course1000.htm
where information about the course will be presented as needed.

5. Short Course Description and Prerequisites.

A major objective of this course is to help you acquire knowledge of chemistry as the central, experimental
natural science, which deals with the composition of materials, their structures and properties, and related energy
conversions in living and nonliving systems. This course will provide students with an informed understanding of
the nature of scientific reasoning, discovery, and invention through a systematic exploration of the basic concepts
and practices of chemistry. The course will also demonstrate the applicability of scientific concepts and thinking
processes to significant current issues in science. These aims will be accomplished by a comprehensive understanding of most of the required text.

**Prerequisite:** High school algebra or equivalent.

6. Textbooks.

The book listed below should be available from the bookstore.

- **Required.**
  - *Zumdahl*
  - "Basic Chemistry"
  - Houghton Mifflin, Fifth edition, 2004

This book includes the study guide, selected solution manual, and Student Support package for a very reasonable price.

7. Course Objectives.

This course will consider scientific inquiry in historical and cultural contexts. Historical examples of scientific creativity will be provided as appropriate to the topic being covered. We will also look at the progress of physical and chemical discoveries and their impact on our way of life. In this way, we will learn to develop a respect for limits on resources and responsibilities which face modern citizens. Overall, this course will explore the distinctive nature of scientific thinking, emphasizing:

* Distillation of seemingly disparate data into unifying concepts derived from theoretical constructs having wide applicability.
* Quantitative precision based on observation and experimental measurements; this requires the ability to do multiple, controlled laboratory experiments which can be replicated by others.

Students will develop an appreciation of the ways that scientists develop concepts and methods with practical applications which have direct implications for contemporary life.

8. Teaching Methodology.

   **Lecture**

   Lectures assisted with transparencies, demonstrations, and some videotapes will constitute the major form of instruction for this course. From the outset, you are advised to read and study the required text (when you get it) before coming to the lecture. There are also problem sets (consisting of questions from the book) assigned for you to master with the help, if needed, of the chemistry learning center coaches.

   There will be three term exams and one final exam based on material covered in the lectures, including the various demonstrations (live or on video) which are only observable if you attend lectures, and the appropriate chapters in the text. Therefore, it is critical that you attend lectures. If you represent the university in athletics and there is a scheduling conflict with an exam, it is possible to make allowances for this. Be sure to bring your own calculator (only non-programmable calculators are allowed, such as the Casio FX-260 and the TI-30x iis) and a number 2 pencil to lectures in order to do the quizzes. It is not possible to borrow calculators. You only need a calculator that can multiply, divide, add, subtract, and handle scientific notation. This is referred to as a scientific calculator and sells for $10 in Walmart. Nothing else is permitted. The large blue calculators used in Math courses are not allowed, etc. See me with the calculator if you are confused.

**Please note that there are no make-up exams.**
CH0011 Preparatory Chemistry, Fall 2004
CH0011 – Development of Chemistry Skills (1 credit)

All students enrolled in CH1000 Preparatory Chemistry should be co-enrolled in CH0011.

During the first week of class, please stop by the Chemistry Learning Center, Room 208 of the Chemical Sciences Building between 8:00 – 5:00 pm to sign up for a weekly, one hour session. The one-hour session will begin the second week of class and you are required to attend all sessions.

Grades in CH0011 are satisfactory/unsatisfactory based on attendance. You are expected to attend every weekly session at the time that you sign up for during the first week. However, you are allowed to miss one session during the semester and still receive a satisfactory grade in CH0011.

At your weekly session, you will be working in small study groups with a coach from the Chemistry Learning Center present to guide your work.

Please bring the following to each CH0011 session:

- class notes
- completed homework
- textbook
- calculator

You will have an opportunity to earn 1000 points toward your course grade at most of these sessions by working a problem that will be assigned randomly.

Chemistry Learning Center

Beginning on Tuesday, September 7th, the Chemistry Learning Center walk-in hours for Fall Semester are:

<table>
<thead>
<tr>
<th>Day</th>
<th>12:00 noon – 4:00 pm</th>
<th>7:00 – 9:00 pm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tuesday</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wednesday</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thursday</td>
<td>12:00 noon – 4:00 pm</td>
<td></td>
</tr>
</tbody>
</table>

In addition to your weekly one-hour session for CH0011, everyone is encouraged to make use of the Chemistry Learning Center for individual assistance during our walk-in hours. There is no cost for using the services. The Center is staffed by friendly, upper level undergraduate students who have a good background in chemistry and are familiar with the courses. The CLC is a relaxed, comfortable place to get help or to use as a study place. There are additional books and other resources available.

The Chemistry Learning Center is located in Room 208 of the Chemical Sciences Building. If you would like additional information, contact Lois Blau, Coordinator at 487-2297 or lablau@mtu.edu or the website at http://www.chemistry.mtu.edu/pages/clc/index.php.

9. Academic Integrity Policy.

Standards of academic conduct are set forth in the University's Academic Integrity Code, which can be found in the MTU Student Handbook or at www.admin.mtu.edu/os/academic/htm. By registering for this course, you have acknowledged your awareness of the Academic Integrity Code, and you are obliged to become familiar with your rights and responsibilities as defined by the Code. Violations of the Academic Integrity Code will not be treated lightly, and disciplinary actions will be taken should such violations occur. This includes plagiarism or receiving inappropriate assistance on examinations and laboratory assignments. Cheating is an extremely serious academic
offense. Allegations of cheating will be referred to the Dean of Student Affairs (Dr. Les P. Cook Ed. D.) for appropriate action. Please see me if you have any questions about the academic violations described in the Code or as they relate to particular requirements of this course.

10. Grading Policy.

Your grade will be assessed on the basis of three 50-minute exams (60% of the total grade), the learning center assessment (10%) and one 2-hour final exam (30% of the total grade).

<table>
<thead>
<tr>
<th>Lecture part of the course</th>
<th>Points Assigned</th>
</tr>
</thead>
<tbody>
<tr>
<td>Three 50 minute term exams</td>
<td>6,000</td>
</tr>
<tr>
<td>Learning centre assessment</td>
<td>1,000</td>
</tr>
<tr>
<td>one 2 hour final exam</td>
<td>3,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>10,000</strong></td>
</tr>
</tbody>
</table>

To determine your grade as a percentage, divide your point total by 100.

A grade of A and AB, (AB 80-84%, A 85-100%) in this course will imply that the student has mastered the full range of topics covered in the lectures and can very successfully apply these to solve the problems presented. The student can derive the important factors that lead to the best solution and makes particularly insightful contributions to tutorial and class discussions.

A B or BC (BC, 70-74%, B, 75-79%) grade would imply that the student has a thorough understanding of the subject. The student can think things through and makes helpful contributions to tutorial and class discussions.

A C or CD (CD, 60-64%, C, 65-69%) grade would suggest that the student understands the subject matter but there are gaps in the scope of understanding. Some topics need more work. The student takes part in tutorial and class discussions and listens carefully when not actively participating.

A D (D, 50-59%) grade implies that the student has only partial knowledge of the subject. The student is unable to make effective use of this knowledge and does not understand what is going on in the classroom. Makes little or no contribution to the discussions in tutorial sessions or in the class.

The F grade (F, <50%) suggests that the performance was wholly inadequate.

11. Description of Types of Examinations.

The three 50 minute exams and the final exam will consist of multiple-choice questions. Occasionally short answer questions may also be posed.

An example of a multiple-choice question is:

1/ Multiple choice

The atomic mass and the atomic weight of an atom are

a. numerically different.  b. numerically the same.

c. based upon different standards.  d. determined by different experimental methods.

e. both assigned units of grams.
12. Detailed Schedule of Lectures and Examinations.
The lectures will be held in DOW 641 at 1005 - 1055 PM on Mondays, Wednesdays and Fridays. Note that the term exams are held at night. There will not be lectures held on those days, except for the last term exam, see below.

<table>
<thead>
<tr>
<th>Date</th>
<th>Chapter</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 (Aug.)</td>
<td></td>
<td>How to study chemistry!</td>
</tr>
<tr>
<td>1 / 3 / 8 (Sept.)</td>
<td>1, 2</td>
<td>Chemistry: Measurement and Calculations</td>
</tr>
<tr>
<td>10/13/15</td>
<td>3</td>
<td>Matter and Energy</td>
</tr>
<tr>
<td>17/20/22</td>
<td>4</td>
<td>Chemical Foundations</td>
</tr>
<tr>
<td>24/27</td>
<td>5</td>
<td>Nomenclature</td>
</tr>
<tr>
<td><strong>29</strong></td>
<td></td>
<td><strong>First term exam (Chapters 1-4 at 6:00-7:00PM)</strong></td>
</tr>
<tr>
<td>1 / 4 (Oct.)</td>
<td>6</td>
<td>Chemical Reactions</td>
</tr>
<tr>
<td>6 / 8 / 11</td>
<td>7</td>
<td>Reactions in Aqueous Solutions</td>
</tr>
<tr>
<td>13 / 15 / 18</td>
<td>8</td>
<td>Chemical Composition</td>
</tr>
<tr>
<td>20 / 22 / 25</td>
<td>9</td>
<td>Chemical Quantities</td>
</tr>
<tr>
<td><strong>27</strong></td>
<td></td>
<td><strong>Second term exam (Chapters 5-8 at 6:00-7:00PM)</strong></td>
</tr>
<tr>
<td>29 / 1 / 3 (Nov.)</td>
<td>10</td>
<td>Modern Atomic Theory</td>
</tr>
<tr>
<td>5 / 8 / 10</td>
<td>11</td>
<td>Chemical Bonding</td>
</tr>
<tr>
<td>12 / 15 / 17</td>
<td>13</td>
<td>Liquids and Solid</td>
</tr>
<tr>
<td><strong>19</strong></td>
<td></td>
<td><strong>Thanksgiving Break</strong>. Lecture will be given on December 1, 2004*</td>
</tr>
<tr>
<td>29 / 1 (Dec.)</td>
<td>14</td>
<td>Solutions</td>
</tr>
<tr>
<td><strong>1</strong></td>
<td></td>
<td><strong>Third term exam (Chapters 9-11 &amp; 13 at 6:00-7:00PM)</strong></td>
</tr>
<tr>
<td>3 / 6 / 8</td>
<td>15</td>
<td>Acids and Bases</td>
</tr>
<tr>
<td>10</td>
<td>Review</td>
<td></td>
</tr>
<tr>
<td><strong>13-17</strong></td>
<td></td>
<td><strong>Final Exam (12:30-2:30PM) date to be announced.</strong></td>
</tr>
</tbody>
</table>

*The lecture for December 19, the day before the Thanksgiving holiday will be given on December 1 the date of the third term exam.
13. Listing of Problems for Learning Center Study Sessions

This is a listing of problems for you to discuss and answer during the learning center sessions. Please attempt them before these sessions as it is the purpose of the coach to provide assistance with material you do not understand, rather than giving you a lecture on how to solve them. You do have detailed solutions to the even numbered questions so if you are stumped on a particular question, find an equivalent looking one and see if this would provide any clues as to how to do the question. Be sure and work through questions from the pertinent chapters before the term exams.

Chapter

1: All odd-numbered questions in "Questions and Problems", page 12.
2: The first two odd-numbered questions in "Questions and Problems" for each section starting out on page 46. This would be numbers: 1, 3, 15, 17, 19, 21, 33, 35, 37, 39, 57, 59, 71, 73, 83, 85, 101, 103 (NB: Problems in the "Additional Problems" are included in this list and also for the chapters below)
3: The first two odd-numbered questions in "Questions and Problems" for each section starting out on page 74.
4: The first two odd-numbered questions in "Questions and Problems" for each section starting out on page 115.
5: The first two odd-numbered questions in "Questions and Problems" for each section starting out on page 143.
6: The first two odd-numbered questions in "Questions and Problems" for each section starting out on page 166.
7: The first two odd-numbered questions in "Questions and Problems" for each section starting out on page 201.
8: The first two odd-numbered questions in "Questions and Problems" for each section starting out on page 238.
9: The first two odd-numbered questions in "Questions and Problems" for each section starting out on page 268.
10: The first two odd-numbered questions in "Questions and Problems" for each section starting out on page 309.
11: The first two odd-numbered questions in "Questions and Problems" for each section starting out on page 349.
12: The first two odd-numbered questions in "Questions and Problems" for each section starting out on page 417.
13: The first two odd-numbered questions in "Questions and Problems" for each section starting out on page 446.
14: The first two odd-numbered questions in "Questions and Problems" for each section starting out on page 477.

Learning center quizzes will be given during the following weeks: Quizzes start during the third week of the semester.

Week of Sept 13 for Chapters 1 and 2, 20 for Chapter 3, 27 for 4, Oct 4 for 5, 11 for 6, 18 for 7, 25 for 8, Nov 1 for 9, 8 for 10, 15 for 11, 29 for 13 and Dec 6 for Chapter 14. There are a total of 12 quizzes. You have to know how to solve the problems listed above before your appointment in the learning center.