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.

This course is a first level course in the chemistry department’s listing of courses for the chemistry major
certified by the American Chemical Society (ACS) and other majors requiring two semesters of chemistry.

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

Course Lecturer:   Rudy Luck,  19-701b, (487-2309)
rluck@mtu.edu
Office Hours:   M,T,W,R,F 1:00 PM - 2:00 PM
Lab Supervisor   Lorri Reilly, 19-508A, (487-2044) lareilly@mtu.edu

3. Purpose of this Syllabus.

Welcome to University Chemistry I. 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. If you have any difficulty with the problems these can be discussed at the recitation periods, with
a coach in the learning center or with me during office hours. Please take advantage of these opportunities.

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. These aims will be accomplished
by a comprehensive understanding of approximately the first half of the required text. Students will attain an
understanding of atomic and molecular structure, the mole, gases, 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 one hour lectures five times per week for seven weeks.

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 approximately the first half of the required text.
6. Textbooks.

The book listed below should be available from the bookstore. **This is all that you need.**

**Required.** Raymond Chang

*CHEMISTRY*,
McGraw Hill, Tenth edition

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 a critical appreciation of the ways that scientists develop concepts and methods with practical applications which have direct implications for contemporary life. This course covers units on energy conversions, properties of solutions, gases and solids, structure of atoms, equilibrium and its relation to thermodynamics as well as everyday life, properties of materials in aqueous solution, and bonding and molecular structure with emphasis on geometry.

8. Teaching Methodology.

**Lecture**

Attendance at the lectures is required and will be noted. Lectures assisted with transparencies and perhaps some videotapes will constitute the major form of instruction for this course. From the outset, you are advised to read and study the material in advance of the lectures. You should also come to the lecture with the idea of solving problems. You should always have the textbook, assigned problems and a calculator at each lecture. The lectures will be very interactive and you will have to solve problems during the lectures.

**Homework**

You should work through the problems at the end of each chapter on a nightly basis. Recommended assigned problems are listed on page 4. Were you to complete these problems and those in the assigned problem sets, you would get a very high grade in this course.

**Exams**

There will be two term exams held during lecture time and one final exam based on material covered in the lectures, the appropriate chapters in the text and from the problem sets. It is critical that you attend lectures.

**Please note that there are no make-up exams.**

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 [http://www.sa.mtu.edu/dean/](http://www.sa.mtu.edu/dean/). 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 (Gloria B. Melton) 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.

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10. Grading Policy.

The course will be assessed on the basis of two 60-minute exams (50% of the total grade), the problem sets (15% of the total grade) and one 2-hour final exam (35% of the total grade).

<table>
<thead>
<tr>
<th>Lecture part of the course</th>
<th>% of the final grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two 1 hour term exams</td>
<td>50</td>
</tr>
<tr>
<td>Problem Sets</td>
<td>15</td>
</tr>
<tr>
<td>2 1/2 hour final exam</td>
<td>35</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
</tr>
</tbody>
</table>

A grade of A and AB, (AB 80-85%, A 86-100%) 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 grade of B or BC (BC, 70-74%; B, 75-79%) 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 grade of C or CD (CD, 55-59%, C, 60-69%) 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 grade of D (D, 50-54%) 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 student wasted a semester (i.e., 1.2 summer months) at MTU.

11. Description of Types of Examinations.

The two 50 minute and final exams will be mostly multiple choice in nature with some short and long answer questions.

Examples of these questions are:

1/ Short answer
Write out the molecular formula for nitric acid ____________________.

2/ Long answer
List the important aspects that knowledge of the structure of DNA affords for mankind.

The multiple choice questions will be similar to those on the problems we do in class.
12. Detailed Schedule of Lectures and Examinations.

The lectures will be held in CH101 at 9:35-10:35 AM on Monday to Friday every day.

<table>
<thead>
<tr>
<th>Date</th>
<th>Chapter</th>
<th>Topic</th>
<th>Question number</th>
</tr>
</thead>
<tbody>
<tr>
<td>May 9-10</td>
<td>1</td>
<td>Chemistry: The Study of Change</td>
<td>3, 4, 5, 7, 9, 13, 14, 17, 18, 21, 23, 26, 27, 32, 33, 36, 42, 46, 50, 60, 76</td>
</tr>
<tr>
<td>10-11</td>
<td>2</td>
<td>Atoms, Molecules, and Ions</td>
<td>1, 6, 8, 9, 11, 14, 17, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 41, 45, 48, 52, 54, 59, 66</td>
</tr>
<tr>
<td>12-16</td>
<td>3</td>
<td>Mass Relationships in Chemical Reactions</td>
<td>2, 4, 6, 10, 13, 17, 19, 25, 27, 30, 32, 34, 37, 42, 49, 59, 67, 70, 82, 86, 93, 117, 135</td>
</tr>
<tr>
<td>17-19</td>
<td>4</td>
<td>Reactions in Aqueous Solutions</td>
<td>1, 3, 6, 8, 12, 15, 17, 20, 22, 26, 27, 30, 34, 37, 40, 45, 48, 57, 63, 65, 68, 72, 76, 78, 84, 88, 96, 122</td>
</tr>
<tr>
<td>20-23</td>
<td>5</td>
<td>Gases</td>
<td>5, 6, 8, 13, 17, 21, 26, 30, 36, 42, 52, 55, 63, 70, 77, 85, 93, 143, 161</td>
</tr>
<tr>
<td>24 (May)</td>
<td>Chap 1-5</td>
<td>First Term Exam</td>
<td></td>
</tr>
<tr>
<td>25-27</td>
<td>6</td>
<td>Thermochemistry</td>
<td>1, 3, 7, 11, 12, 14, 17, 21, 24, 26, 29, 31, 33, 40, 43, 49, 54, 58, 62, 70, 80, 91</td>
</tr>
<tr>
<td>31-June 2</td>
<td>7</td>
<td>Quantum Theory and the Electronic Structure of Atoms</td>
<td>1, 3, 6, 8, 14, 15, 18, 24, 29, 35, 38, 41, 44, 48, 54, 57, 65, 71, 74, 77, 81, 82, 89, 92, 96, 118, 120</td>
</tr>
<tr>
<td>3-7</td>
<td>8</td>
<td>Periodic Relationships Among the Elements</td>
<td>1, 3, 5, 7, 12, 15, 19, 22, 27, 33, 35, 43, 46, 49, 51, 56, 59, 63, 65, 71, 74, 77, 81, 116</td>
</tr>
<tr>
<td>8-10</td>
<td>9</td>
<td>Chemical Bonding I: Basic Concepts</td>
<td>1, 4, 7, 14, 15, 18, 23, 25, 31, 34, 35, 40, 43, 46, 47, 49, 51, 54, 59, 63, 76, 92, 100, 134</td>
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<tr>
<td>13-15</td>
<td>10</td>
<td>Chemical Bonding II:</td>
<td>1, 3, 6, 8, 12, 15, 16, 18, 23, 25, 27, 28, 30, 31, 36, 38, 41, 46, 47, 51, 63, 69, 75, 89</td>
</tr>
<tr>
<td>16 (June)</td>
<td>Chap 6-10</td>
<td>Second Term Exam</td>
<td></td>
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<tr>
<td>17-21</td>
<td>11</td>
<td>Intermolecular Forces and Liquids and Solids</td>
<td>1, 3, 4, 7, 11, 14, 18, 21, 29, 33, 34, 37, 39, 40, 45, 49, 55, 66, 70, 80, 91, 95, 100, 137</td>
</tr>
<tr>
<td>22-23</td>
<td>12</td>
<td>Physical Properties of Solutions</td>
<td>1, 5, 8, 10, 13, 17, 21, 24, 28, 33, 34, 36, 39, 41, 46, 50, 67, 73, 112, 119</td>
</tr>
<tr>
<td>24</td>
<td>All Material</td>
<td>Final Exam</td>
<td></td>
</tr>
</tbody>
</table>
13. Problem Set assignments.

In order to do well in University Chemistry, you must attempt problems. If it were possible to do well without problems, the book would not list that many. You must attempt the problems on page 4 and the problems available online. These online problems are available when you logon to the site https://courses.mtu.edu/webct/entryPageIns.dowebct.

Using WebCT

WHAT SOFTWARE DO I NEED?

- All you need is a web browser to connect to WebCT. Internet Explorer (v. 5.0, 5.2 (for Mac users) 5.5SP2, 6) or Netscape (4.5x, 4.6x, all versions of 4.7 except 4.78 and 4.79, 7.0x, 7.1) Mozilla and Safari should also work. Refer to http://www.webct.com/quickstart/viewpage? for more detailed information as well as the recommended browser settings.
- You can access WebCT from anywhere in the world, as long as you have an internet connection and one of the browsers mentioned above.

How do I log on?

Start your web browser and go to: https://courses.mtu.edu/webct/entryPageIns.dowebct.
- Enter your User ID and MTU Password in the corresponding fields after you select “Log in using your MTU userid and ISO password”. Then click on OK.
- WebCT User ID = your MTU ID User ID (eg: if your mtu email id is: janed@mtu.edu; then your WebCT ID username is: janed).
- WebCT Password = your MTU ID password

How do I take the Problem Sets?

As part of your course, your instructor may choose to have you complete some online WebCT quizzes. These are similar to paper quizzes but they are done through the internet. Some quizzes may count for marks, others may let you practice and test your knowledge, and yet others may be used as assignment submissions.

- From your course homepage, click on the Assessments link/icon.

Chapter 1 Review

Start: May 5, 2011 8:49 PM
End: May 11, 2011 9:58 PM

- To submit or work on a quiz, click on the quiz title. A new page with Quiz instructions will appear. Read the instructions and then click on the Begin Quiz button.
- A new window will pop up that is divided in two sections. The left hand side contains the quiz questions, and the right hand side shows your progress.
- To answer a question, type in or select your answer and click on the Save Answer button located below the question. You will then notice in the right hand frame that a red dot for the question turned to a green star. This means you’ve answered that particular question.
- If you made a mistake - don’t worry. You can change your answers if you wish. Simply type in or select a new answer and click on the Save Answer button again.
- To leave a quiz without submitting it for grading, just close the quiz window.
- If you are done and ready to submit your quiz, click on the Finish button at the bottom of the page. At the next prompt, confirm that you really want to submit the quiz. You CANNOT take back a submitted quiz!

This is all you need to use the WebCT site for. Since we are meeting every day save any questions that you may have for the class, since others may have similar concerns. You have to finish the quiz in the time allotted. There are no make-up quizzes or exams.