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

Class times: M T W R 10:05-11:40 am Place: 19/101

This course is a second 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: Parag Jog (19-605)
pvjog@mtu.edu
Office Hours: (e-mail me to make an appointment)

Lab Supervisor: Lorri Reilly, 19-508B, (487-2044) lareilly@mtu.edu

3. Purpose of this Syllabus.

Welcome to University Chemistry II. 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. 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 with a coach in the
learning center or with me. Please take advantage of these opportunities.

The role of your instructor will be to guide you through your studies by presenting
outlines of material considered important, helping you understand concepts by working through
eamples, and by providing other useful resources and assistance to help you with your studies.
Your instructor cannot provide you with all the information you need to learn and understand
material for this class.
4. Introduction

University Chemistry provides an overview of the chemical concepts that I believe are important to your science and engineering careers. It is my hope that by the end of this course you will have both an appreciation of how important chemistry is to our daily lives, and a greater interest in the subject than when you arrived here. University Chemistry II is the second semester of a one-year course for majors requiring a full year of chemistry.

5. Prerequisites

Prerequisite: CH1100 or (CH1110 and CH1111)

6. Textbooks

The book listed below should be available from the bookstore.

Required. McMurray and Fay
"CHEMISTRY",


7. Teaching Methodology.

Lecture

Attendance in lecture is mandatory. However, you may not receive any warnings or punishments for not attending lecture or studying, but when it comes to exams and you do not understand the material, I will not be able to help you. From the outset, you are advised to read and study the required text. In fact you should read the relevant sections before coming to the lecture.

Homework

You should work through the problems assigned at the end of each chapter on a nightly basis.

Exams

There will be three 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 assigned. It is critical that you attend lectures and your attendance will be noted.

Please note that there are no make-up exams.

Textbook Problems and Assigned Homework:

The textbook problems have been selected to provide you with a good overview of the content areas I believe you need to be familiar with. Although working through the problems provides no guarantee that you will get a grade A in the class, it certainly increases your chances. The problems I would like you to complete each week are listed in the table along with the assigned reading for that week.
8. 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/dos/acadinteg1.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 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.

9. Grading Policy.

Your grade will be assessed on the basis of three 55-minute exams (45% of the total grade) and one cumulative 2-hour final exam (30% of the total grade).

<table>
<thead>
<tr>
<th>Lecture part of the course</th>
<th>% of the final grade</th>
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<tbody>
<tr>
<td>Three 55 minute term exams</td>
<td>45</td>
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<tr>
<td>One 2 hour final exam</td>
<td>30</td>
</tr>
<tr>
<td>Laboratory Grade (CH 1120)</td>
<td>25</td>
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<td><strong>Total</strong></td>
<td><strong>100</strong></td>
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**Important:** The lab portion of CH1120 is worth 25% of your final grade. You must pass both the lecture and the laboratory portions of CH1120. Anyone who fails the either section of CH1120 automatically fails the entire class regardless of the total scores.

GRADE SCALE
A: 90 - 100 %
AB: 86 - 89 %
B: 80 - 85 %
BC: 70 - 79 %
C: 60 - 69 %
CD: 55 - 59 %
D: 50 - 54 %
F: Below 50 %

10. Description of Types of Examinations.

The three 55 minute and final exams will be mostly multiple choice in nature.
11. Detailed Schedule of Lectures and Examinations.

*The lectures will be held in 19-101 at 10:05-11:40 AM on Mondays, Tuesdays, Wednesdays and Thursdays. The first half of the lecture is denoted by “A” (i.e., 10:05-10:55) and the second half by “B” (i.e., 11:00-11:40).*

<table>
<thead>
<tr>
<th>Date</th>
<th>Chapter</th>
<th>Topic</th>
<th>Problems</th>
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</thead>
<tbody>
<tr>
<td>Jun 28</td>
<td>23</td>
<td>Organic Chemistry</td>
<td>Problems</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>29-32, 38-40, 42, 44, 50-52, 54-56, 58, 60, 66, 68, 69, 72, 74, 76-78</td>
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<tr>
<td>Jun 29</td>
<td>23</td>
<td>Organic Chemistry</td>
<td>Problems</td>
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<td>80, 82-84, 87, 90, 94-97.</td>
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<tr>
<td>Jun 30</td>
<td>13</td>
<td>Chemical Equilibrium</td>
<td>Problems</td>
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<tr>
<td>Jul 1</td>
<td>13</td>
<td>Chemical Equilibrium</td>
<td>Problems</td>
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<td></td>
<td></td>
<td></td>
<td>28-34, 36, 38, 44-48, 49, 52, 56-64, 66, 70, 76, 78-82</td>
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<tr>
<td>Jul 5</td>
<td>-</td>
<td>Independence day Recess</td>
<td>-</td>
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<tr>
<td>Jul 6</td>
<td>15</td>
<td>Aqueous Equilibria: Acids and Bases</td>
<td>Problems</td>
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<tr>
<td>Jul 7</td>
<td>15</td>
<td>Aqueous Equilibria: Acids and Bases</td>
<td>Problems</td>
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<td></td>
<td></td>
<td>31-37, 40-104 (red problems)</td>
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<tr>
<td>Jul 8</td>
<td></td>
<td>Exam 1 (Chapters 23, 13 and 15)</td>
<td>Application of Aqueous Equilibria</td>
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<tr>
<td>Jul 12</td>
<td>16</td>
<td>Application of Aqueous Equilibria</td>
<td>Problems</td>
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<tr>
<td>Jul 13</td>
<td>16</td>
<td>Application of Aqueous Equilibria</td>
<td>Problems</td>
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<td>34-43, 44-118 (red problems)</td>
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<tr>
<td>Jul 14</td>
<td>17</td>
<td>Thermodynamics: Entropy, etc.</td>
<td>Problems</td>
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<tr>
<td>Jul 15</td>
<td>17</td>
<td>Thermodynamics: Entropy, etc.</td>
<td>Problems</td>
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<td>20-29, 30-90 (red problems)</td>
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<tr>
<td>Jul 19</td>
<td>18</td>
<td>Electrochemistry</td>
<td>Problems</td>
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<tr>
<td>Jul 20</td>
<td>18</td>
<td>Electrochemistry</td>
<td>Problems</td>
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<td></td>
<td>24-29, 30-96 (red problems)</td>
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<tr>
<td>Date</td>
<td>Subject</td>
<td>Chapter/Section</td>
<td>Notes</td>
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<tr>
<td>Jul 21</td>
<td>Exam 2 (Chapters 16-18)</td>
<td>The Main Group Elements</td>
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<td>Jul 22</td>
<td>19</td>
<td>The Main Group Elements</td>
<td>Problems 13–98 (red problems)</td>
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<td>Jul 26</td>
<td>20</td>
<td>Transition Elements</td>
<td>Problems</td>
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<tr>
<td>Jul 27</td>
<td>20</td>
<td>Transition Elements</td>
<td>Problems 18-23, 26–107 (red problems)</td>
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<tr>
<td>Jul 28</td>
<td>21</td>
<td>Metals and Solid-state materials</td>
<td>Problems (if time permits)</td>
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<tr>
<td>Jul 29</td>
<td>Exam 3 (Chapters 19-21)</td>
<td>Nuclear Chemistry</td>
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<tr>
<td>Aug 3</td>
<td>24</td>
<td>Biochemistry</td>
<td>Problems</td>
</tr>
<tr>
<td>Aug 4</td>
<td>24</td>
<td>Biochemistry</td>
<td>Problems</td>
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<tr>
<td>Aug 5</td>
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<td>Review for final</td>
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<tr>
<td>Aug 6</td>
<td></td>
<td>Final Exam (Cumulative)</td>
<td>10:05-11:40 AM</td>
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12. Lecture outline topics:

Chapter 23: Organic Chemistry

- Saturated Hydrocarbons
- Unsaturated Hydrocarbons
- Aromatic Compounds
- Alcohols, Ethers and Amines
- Carbonyl Containing Compounds

Chapter 13: Chemical Equilibrium

- Extent of chemical reactions
- Equilibrium mixture composition
- System under stress
- Chemical kinetics and chemical equilibrium

Chapter 15: Aqueous Equilibria: Acids and Bases

- Arrhenius Acids and Bases
- Dissociation of Water
- Bronsted-Lowry Acids and Bases: Proton-Transfer Reactions
- Bronsted-Lowry Acids and Bases: Dissociation in Water
- Lewis Acids and Bases

Chapter 16: Applications of Aqueous Equilibria

- Neutralization Equilibria
- Common-Ion Effect and Buffer Solutions
- Solubility Equilibria
- Complex Equilibria

Chapter 17: Thermodynamics: Entropy, Free Energy and Equilibrium

- Molecular Randomness and Chemical and Physical Changes
- Free Energy Change

Chapter 18: Electrochemistry

- Galvanic Cells: Spontaneous Oxidation-Reduction Reactions
- Galvanic Cells: Cell Potentials
- Galvanic Cells: Free Energy Changes
- Electrolytic Cells
Chapter 19: The Main Group Elements

- Periodic Properties
- Boranes
- Group 4A
- Group 5A
- Group 6A
- Halogen Oxoacids

Chapter 20: Transition Elements and Coordination Chemistry

- D-Block Elements: Properties
- Coordination Compounds: Ligands
- Coordination Compounds: Constitutional Isomers and Stereoisomers
- Coordination Compounds: Valence Bond Theory
- Coordination Compounds: Crystal Field Theory

Chapter 21: Metals and Solid-state Materials

- Minerals and Free Metals
- Bonding Descriptions
- Semiconductors
- Ceramics and Composites

Chapter 22: Nuclear Chemistry

- Atomic Nuclei
- Nuclear Reactions
- Energy Changes
- Radionuclides

Chapter 24: Biochemistry

- Biochemical Energy Changes
- Proteins
- Carbohydrates
- Fats & Oils
- Nucleic Acids