INTRODUCTION: CH1150-University Chemistry I is the first of a two-semester sequence designed to give you an overview of the fundamental chemistry topics and problem solving skills required by most science and engineering disciplines. Even if your major does not require the second semester you may be interested in taking it as a science elective because you already have the book. Students in CH1150 are required to take the associated laboratory (CH1151) as a co-requisite.

This course is blended, which means that it has a mix of online and in-class components, including:

- Lecture materials recorded as short video clips during summer 2012
- Online (Canvas) pre-class assignments associated with one or more of the video clips
- Classroom review of material covered in the video, pre-class assignments, and textbook
- iClicker and online classroom participation and textbook reading questions
- Chemistry Learning Center, Supplementary Instruction, Recitation, and Laboratory Sessions

In order for the blended classroom environment to help you learn, you must:

- Keep up with all the online (due dates in calendar), and in-class components
- Ask questions about things you are unclear on before, during, and after class
- Stop chatting, or playing with mobile devices, because it disrupts the class
- Answer your own i>Clicker questions rather than copying your friend's, or internet, answers
- Fill in the blanks in your understanding by studying your textbook.

COURSE PACK: A course pack has been produced for this class that contains PowerPoint slides (known as Redinotes) and a large selection of exams and problems from previous classes that I have taught. The PowerPoint slides are not available in any other format because we sign a contract with the publisher to bundle them with the new text at a significantly reduced cost. If you buy a used book, they are available separately. These notes are NOT designed to replace taking good notes and they are not designed to replace the textbook, but they will reduce your need to copy everything from the slides. Answer keys are not included with the pack because we prefer you visit the Chemistry Learning Center for clarification.

STUDYING - Chemistry is really easy to pass, but it is even easier to fail: It is your actions that will determine where you lie on this scale. I whole heartedly encourage you to explore what Michigan Tech has to offer, particularly when the snow flies, but do this AFTER you have completed a couple of hours studying each night and you will be much happier in your classes. If you choose not to study the recommended minimum of 3 hours per credit per week you may find your grades are not quite what you expected.

CANVAS: Canvas will be used to administer online homework and quizzes, provide resources, and manage communications. To access Canvas you go to http://mtu.instructure.com and enter your Michigan Tech ISO username and password, or enter through “My Michigan Tech.” Once logged in, you will be presented with a list of the courses you are currently registered in.
EXAMINATIONS: There will be three multiple-choice "hour" exams worth 100 points each, and one multiple-choice final exam worth 200 points. The "hour" exams will take place at 6:00pm on October 2nd, October 30th, and December 4th. In lieu of each evening exam, cancelled classes are tentatively scheduled for October 17th, October 25th, and November 22nd.

Final exam dates are located at http://www.admin.mtu.edu/em/students/plan/finalexam.php

GRADING: Your grade will be based upon the percentage of the total points available that you accumulate and are divided between assignments as shown below. The grading curve for this class is provisionally set at 58%, a grade C is set at 68%, a Grade B is set at 78%, a Grade A is set at 88%. Half grades are usually set approximately 3% below a full grade. Individual assignments will not be curved.

Canvas 20%
iClicker 20%
Exams 60%

ELECTRONIC DEVICES: Turn off and stow unapproved electronic devices for the duration of each class period because they disturb people around you. Computers, tablets, and other handheld devices are not required for this class, and therefore not permitted. The only approved devices are calculators and i>Clickers. If you need other devices as assistive technology, you must ask before using them, and must sit at the front of the classroom. Failure to comply will have consequences. Only dedicated calculators and foreign language translation devices may be used during examinations.

LEARNING ACCOMMODATIONS: If you require accommodations, a quiet place to take exams, recorded textbooks etc., please contact the Coordinator of Student Disability Services in the Dean of Students Office, Room 170 Administration, 487-2212. If we do not know about you, we cannot help you. So, please do not wait until you are failing your classes to ask for help.

ACADEMIC INTEGRITY: Both students and faculty are responsible for ensuring the academic integrity of the University according to the procedures in "Academic Integrity at Michigan Tech - A Guide for Students and Faculty." Specific violations in this course would be the intentional use of any unauthorized study aids, equipment, or another's work during an examination (cheating) or allowing/helping another individual to cheat (facilitating academic dishonesty). Possible sanctions include an academic integrity warning, an "F**" grade indicating failure due to academic dishonesty, probation, suspension or expulsion.

ABSENCE POLICY: An unexcused absence is an automatic zero for any exam that is missed. Only the Office of Student Affairs, or your instructor may grant an excused absence. If you know that you will have an official university excused absence on a scheduled exam day (university event, religious holiday, or funeral), you must make arrangements at least one week before the exam date, and provide documentation. Excused absences will not be given to travel home or attend "social" events such as birthdays or weddings, or for sufferers of the "Common Cold." Therefore, you should plan to take your exam at the scheduled time. If you believe you are too sick to take an exam, you must contact the instructor BEFORE the exam and subsequently provide a doctor's note stating your illness prevented you from taking the exam, not simply that you visited the doctors office.

FINANCIAL AID SATISFACTORY ACADEMIC PROGRESS POLICY: Federal financial aid regulations now require students make satisfactory academic progress towards their degree to remain eligible for financial aid, which means we must report whether you failed a class "with effort" or "without effort." For the purpose of this class, I have decided that anyone who does not complete ALL examinations, or attend at least 75% of classes will be considered to have failed "without effort."

i>CLICKER: Studies have shown that it is extremely important for students to be engaged in the classroom experience if they are to maximize their learning. In an attempt to get you thinking about the
material during class, we use i>clicker remotes (available at the bookstore). The i>clicker is a response system that allows you to respond to questions posed during class, and you will be graded on your responses, and your participation. The purpose of i>Clicker remotes is to help guide your learning rather than simply acting as a measure of attendance. In an attempt to achieve this, I will drop up to 10% of the lowest scores so that you can “have bad days” or absences without significant penalty.

In order to receive this credit, you will need to enter your i>clicker remote ID in Canvas within the first TWO WEEKS of class as follows:

1. Log in to canvas
2. Click the i>clicker link on the left bar, or in the module.
3. Enter code from the back of your i>Clicker, and press register.

i>clicker will be used every day in class, and you are responsible for bringing your remote daily.

After the first two weeks I will upload scores on a weekly basis and do not backdate for people who forget to register.

CHEMISTRY LEARNING CENTER (CLC): The CLC is a free service provided by the Department of Chemistry and the University to provide support for students enrolled in first year chemistry lecture courses. The CLC is located in room 208 of the chemical sciences building and staffed by upper level undergraduates (coaches), who have a good background in chemistry and are familiar with the courses. Services offered include weekly appointments, walk-in assistance, reference library, computer-assisted learning and a comfortable place to study chemistry. Stop by for more information.

CH0100: Students who would like to have a weekly individual or team learning group should stop by the CLC during the first week of class to sign up for a time. Plan to attend your first weekly appointment, which begins the second week of classes. Students with regular appointments should be enrolled in CH0100. If you are not enrolled when you sign up for a time, you will be automatically enrolled. There is no cost for CH0100. Plan to attend every appointment. However, you are allowed to miss one appointment if an emergency comes up and still receive a satisfactory grade. Walk-in hours are also available in-between appointments or team meetings.

Chemistry Learning Center Walk-In Hours

<table>
<thead>
<tr>
<th>Day</th>
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<tbody>
<tr>
<td>Sunday</td>
<td>7:00 – 9:00 pm</td>
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<tr>
<td>Monday</td>
<td>10:00 – 4:00 pm</td>
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<tr>
<td>Tuesday</td>
<td>10:00 – 4:00 pm</td>
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<tr>
<td>Wednesday</td>
<td>10:00 – 4:00 pm</td>
</tr>
<tr>
<td>Thursday</td>
<td>10:00 – 4:00 pm</td>
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SUPPLEMENTAL INSTRUCTION (OPTIONAL): The SI sessions are optional but highly recommended. A significant number of hours each week are required to learn the material so that you are prepared for next semester. You won’t be able to learn everything in your short CLC session each week. Since you will need to spend this time studying anyway, students have found it effective to attend 1, 2 or 3 SI sessions each week. Students attending on a regular basis usually earn a full grade higher than those who do not attend. The SI leaders will announce the study session times and locations.
READING LIST: The lectures only provide a guide to the material and you must, therefore, read the relevant textbook chapters prior to the class and again after the class. I also recommend you take notes from the book as you read. You can determine what to read by looking at the list below and matching it to the chapter markers in the Redinotes. I do not provide an exact timeline because class pace varies as a function of such things as student questions, demonstrations, and the number of i>Clicker questions.

Unit 01: Atomic Structure and Periodicity
U01M01: Atomic Structure 01 (Section 2.1-2.3)
U01M02: Atomic Structure 02 (Sections 2.1-2.3)
U01M03: The Mole & Molar Mass (Sections 3.1-3.5)
U01M04: Quantum Mechanical Model (Sections 7.1-7.5)
U01M05: Quantum Numbers (Sections 7.6-7.9)
U01M06: Electron Configurations (Sections 8.1-8.6)
U01M07: Periodic Properties (Sections 8.1-8.6)

Unit 02: Ionic and Covalent Compounds
U02M01: Molecular and Ionic Formulas (Sections 2.5 & 2.6, 9.2)
U02M02: Percent Composition (Sections 3.4-3.6)
U02M03: Empirical Formulas (Sections 3.4-3.6)
U02M04: Molecular Formulas (Sections 3.4-3.6)
U02M05: Inorganic Nomenclature 01 (Section 2.6 & 2.7)
U02M06: Inorganic Nomenclature 02 (Section 2.6 & 2.7)
U02M07: Organic Nomenclature 01 - Introduction To Organic Compounds (Section 2.8)
U02M08: Organic Nomenclature 02 - Alkanes (Sections 2.8, 24.1 to 24.4)
U02M09: Organic Nomenclature 03 - Alkenes and Alkynes (Sections 2.8, 24.1 to 24.4)
U02M10: Organic Nomenclature 04 - Alcohols (Sections 2.8, 24.1 to 24.4)
U02M11: Organic Nomenclature 05 - Aldehydes and Ketones (Sections 2.8, 24.1 to 24.4)
U02M12: Organic Nomenclature 06 - Carboxylic Acids (Sections 2.8, 24.1 to 24.4)
U02M13: Writing Lewis Symbols (Sections 9.1-9.9)
U02M14: Formal Charge and Resonance (Sections 9.1-9.9)
U02M15: Bond Polarity (Sections 9.1-9.9)
U02M16: Molecular Geometry (Sections 10.1-10.5)
U02M17: Molecular Polarity (Sections 10.1-10.5)

Unit 03: Reactions and Equations
U03M01: Writing Chemical Equations (Section 3.7)
U03M02: Balancing Chemical Equations 01 (Section 3.7)
U03M03: Balancing Chemical Equations 02 (http://goo.gl/kj4cT or http://goo.gl/x9mIL)
U03M04: Precipitation and Solubility Rules (Section 4.2)
U03M05: Net-Ionic Equations (Section 4.2)
U03M06: Acids and Bases (Section 4.3)
U03M07: Oxidation-Reduction Reactions (Section 4.4)
U03M08: Redox Balancing in Acid-Base Solutions (Section 4.4, 18.1)
U03M09: Complexation Reactions (Section 23.1 to 23.3)
Unit 04: Stoichiometry
U04M01: Introduction to Stoichiometry (Section 3.8)
U04M02: Limiting Reagents (Section 3.9)
U04M03: Percent Yield and Gravimetric Analysis (Section 3.10)
U04M04: Gravimetric Analysis Methods (Section 4.6)
U04M05: Concentration Units and Molarity (Sections 4.5 & 12.3)
U04M06: Molality and Normality (Sections 4.5 & 12.3)
U04M07: Mass and Volume Percent (Sections 4.5 & 12.3)
U04M08: Concentration Unit Conversion (Sections 4.5 & 12.3)
U04M09: Solution Preparation and Dilution (Sections 4.5 & 12.4)
U04M10: Solution Stoichiometry (Sections 4.7-4.8)

Unit 05: Introduction to Thermodynamics
U05M01: Basic Terminology (Section 6.1 - 6.3)
U05M02: Energy and Work (Section 6.1 - 6.3)
U05M03: Enthalpy of Reactions (Section 6.4)
U05M04: Calorimetry (Section 6.5-6.7)
U05M05: Introduction to Entropy (Section 18.1 - 18.3 and 18.5)
U05M06: Introduction to Free Energy (Section 18.1 - 18.3 and 18.5)

Unit 06: States of Matter
U06M01: Fundamental Gas Laws (Sections 5.1-5.3)
U06M02: Ideal Gas Equation (Section 5.4 & 5.5)
U06M03: Dalton’s Law for Mixtures of Gases (Section 5.6)
U06M04: Kinetic Molecular Theory (Section 5.7)
U06M05: Intermolecular Forces and Liquid Properties (Sections 11.1 to 11.3)
U06M06: Properties of Solids (Sections 11.4-11.7)
U06M07: Phase Changes and Clausius Clayperon Equation (Sections 11.8)
U06M08: Phase Changes and Thermodynamics (Sections 11.8)
U06M09: Phase Diagrams (Sections 11.9)

Unit 07: Properties of Solutions
U07M01: Solutions and the Solution Process (Sections 12.1 & 12.2)
U07M02: Factors Affecting Solubility (Sections 12.4 and 12.5)
U07M03: Van’t Hoff and Vapor Pressure Lowering (Sections 12.6 and 12.7)
U07M04: Boiling Point Elevation and Freezing Point Depression (Sections 12.6 and 12.7)
U07M05: Osmosis and Osmotic Pressure (Sections 12.6 and 12.7)
U07M06: Molar Mass Determination (Sections 12.6 and 12.7)

Unit 08: Introduction to Chemical Kinetics
U08M01: Rates of Reaction (Section 13.1)
U08M02: Rate Law (Section 13.2)
U08M03: First Order Integrated Rate Equation (Section 13.3)
U08M04: Temperature Dependence (Section 13.4)

Unit 09: Introduction to Chemical Equilibrium
U09M01: Equilibrium Concept (Section 14.1)
U09M02: Equilibrium Constant Calculations (Section 14.2 & 14.3)
U09M03: Equilibrium Concentrations (Section 14.4)
**TEXTBOOK PROBLEMS:** You will gain an advantage by working through textbook examples and end of chapter problems after reading the chapter, and before completing the online homework. Even numbered problems have answers in the back of the book:

| Unit 01 | Chapter 02: 05, 06, 14, 16  
|         | Chapter 03: 16, 20, 24, 26, 28, 30  
|         | Chapter 07: 08, 10, 12, 16, 18, 20, 26, 30, 32, 34, 40, 42, 56, 58, 60, 66, 70, 76, 78, 90  
|         | Chapter 08: 20, 22, 24, 28, 32, 38, 44, 46, 52, 56, 62  
| Unit 02 | Chapter 02: 32, 33, 34, 36, 44, 46, 50, 58, 60  
|         | Chapter 03: 40, 42, 44, 46, 48, 50, 52, 54  
|         | Chapter 07: 20, 32, 50, 54, 56, 58  
|         | Chapter 09: 16, 18, 36, 38, 40, 44, 46, 48, 52, 54, 56, 62, 64  
|         | Chapter 10: 08, 10, 12, 14, 20, 22, 24, 32, 36, 40  
|         | Chapter 24: 16, 26, 27, 28, 34, 36, 42, 60  
| Unit 03 | Chapter 03: 59, 60, 63, 64  
|         | Chapter 04: 08, 10, 12, 14, 18, 20, 22, 24, 32, 34, 44, 46, 48, 50, 54, 56  
| Unit 04 | Chapter 03: 66, 68, 70, 72, 74, 76, 82, 84, 86, 90, 92, 94, 108  
|         | Chapter 04: 60, 62, 64, 70, 72, 74, 78, 80, 86, 88, 92, 94  
|         | Chapter 12: 13, 14, 16, 18, 22, 24, 102, 108  
| Unit 05 | Chapter 06: 1, 7, 11, 12, 14, 16, 21, 23, 26, 28, 32, 34, 36, 38, 46, 54, 58, 76, 82  
|         | Chapter 18: 1, 4, 5, 6, 9, 10, 16, 19, 20  
| Unit 06 | Chapter 05: 18, 20, 22, 32, 34, 40, 42, 44, 48, 52, 54, 56, 64, 68, 78, 84, 90  
|         | Chapter 11: 10, 12, 14, 16, 18, 20, 21, 22, 24, 27, 32, 33, 38, 44, 49, 52, 54, 56, 59, 62, 67, 68, 78, 84, 86, 88, 91, 94  
| Unit 07 | Chapter 12: 3, 8, 10, 25, 28, 32, 38, 39, 41, 43, 50, 52, 54, 58, 62, 64, 66, 68, 72, 74, 78  
| Unit 08 | Chapter 13: 2, 3, 6, 8, 10, 14, 15, 16, 18, 24, 25, 26, 31, 33, 35, 37, 38, 40  
| Unit 09 | Chapter 14: 1, 2, 5, 7, 8, 14, 16, 18, 20, 26, 28, 30, 32, 37, 38, 40, 42, 44, 46, 48  

Michigan Tech complies with all federal and state laws and regulations regarding discrimination, including the Americans with Disabilities Act of 1990 (ADA). If you have a disability and need a reasonable accommodation for equal access to education or services at Michigan Tech, please call Christy Oslund, Student Disability Services (cmoslund@mtu.edu), or the Dean of Students (7-2212).