Overview
This course is designed as an undergraduate general chemistry course that provides a broad survey of chemistry. We will start with a discussion of matter, chemical reactions, and stoichiometry. From there, we will focus on the theories that govern gas behavior, thermochemistry, and atomic structure from a quantum perspective. We will use our understanding of atomic structure to focus on periodic trends and how atoms bond together to form compounds. We will then proceed into a discussion of molecular properties and a brief discussion of basic organic chemistry.

During the term, students will complete frequent in-class activities and online homework assignments. There will be four midterm exams, and at the end of the course, students will complete a cumulative final exam.

CHEM 1061/5 and 1062/6 are introductory chemistry courses with accompanying lab courses. The two courses, with labs, are together designed to prepare a student for a major in science (including chemistry and engineering) and the health sciences. Each lecture/lab pair fulfills the core physical science requirement.

Prerequisites
In order to enroll in CHEM 1061, students must have either
• passed the Chemistry Placement Exam and been advised to take this course, or
• completed CHEM 1015 or an equivalent course with a grade of C- or better.

Why is this course considered an important component of my liberal education?
A liberally educated person is one who can understand complex issues, find credible information, analyze that information, problem-solve, and draw reasonable conclusions based on facts. This course, along with lab, will develop these skills and prepare you to be an informed citizen and life-long learner.

In order to register for/remain registered in CHEM 1061, you are required to be registered in both CHEM 1061 and CHEM 1065 during the same term.
Goals

As a component of your undergraduate education here at the University of Minnesota, this course will offer you the opportunity to identify, define, and solve problems and will provide a strong foundation for the mastery of knowledge in the chemical sciences.

Because CHEM 1061 is designed to prepare students for future courses in chemistry, when students leave CHEM 1061, they should have the following skills.

- Content mastery
- Ability to solve a variety of multistep chemistry problems correctly in a timed, high stakes environment
- Time and resource management

Course mastery is required because future CHEM courses (including CHEM 1062) builds on content from CHEM 1061. Because the bulk of your overall course grade is determined by your exam performance, it is essential that you are able to demonstrate this mastery during timed, multiple-choice exams. CHEM 1062 also has timed, multiple-choice exams.

You are responsible for managing your time and resources effectively. Homework assignments are due throughout the semester to help you keep on track. There are a variety of resources available during class and on our course website designed to help you be successful in the course. You must seek out these resources and use them effectively. If developed now, time and resource management skills will serve you throughout your college career.

Evaluation

Students will be evaluated based on online homework and exam performance only. The grading breakdown is as follows.

<table>
<thead>
<tr>
<th>Exams</th>
<th>ALEKS homework</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exam 1: 12%</td>
<td>Prerequisite Review: 2%</td>
</tr>
<tr>
<td>Exam 2: 18%</td>
<td>Homeworks A-H: 4%</td>
</tr>
<tr>
<td>Exam 3: 18%</td>
<td>Full mastery: 4%</td>
</tr>
<tr>
<td>Exam 4: 18%</td>
<td></td>
</tr>
<tr>
<td>Final Exam – ACS: 12%</td>
<td></td>
</tr>
<tr>
<td>Final Exam – Instructor: 12%</td>
<td></td>
</tr>
</tbody>
</table>

Course Materials

*All course materials are available for purchase from U of M Bookstores in Coffman Union and St. Paul Student Center.*

**Required**

- **Online homework code:** ALEKS access code (packaged with textbook or available separately for purchase from publisher’s website)
- **Scientific calculator**

**Recommended**

- **Student solutions manual:** *Chemistry, 7th edition* (free; available on reserve in Walter Library, from the General Chemistry tutor room, or from Dr. Pelton during office hours)
- **Molecular modeling kit**

Letter grades (A-F) will be assigned based on the student’s overall cumulative percentage, with the B-/C+ cutoff set close to the class average.

For further details, please see policy.umn.edu/education/gradingtranscripts.

What should I bring to class?

You should bring your class notebook, something to write with, and the calculator you plan to use during exams.
Course Websites

Lecture Moodle site. Students registered in this course must use the Moodle site created for this class. This site is where you will find any information associated with the lecture portion of the course. It will contain a course calendar, syllabus, and many resources to help you succeed in our course. You will find your exam and homework scores posted here as well, under the “My Grades” link.

Lab (CHEM 1065) Moodle site. This site is where you will find your lab syllabus and multiple resources associated with completion of the laboratory projects. You will view your laboratory grades here, under the “My Grades” link. Please note that lab is a separate, graded course that must be taken at the same time you take our lecture course.

ALEKS site. There is a link from the lecture Moodle site to the ALEKS homework system. Follow the instructions there to set up your account correctly.

How to be Successful in CHEM 1061

Every student defines success differently. At the beginning of the term, define your goal(s) for CHEM 1061 and make a specific, detailed plan on how to get there.

If you get nothing else, take this: Attending lecture and doing the online homework IS NOT ENOUGH to prepare you to do well on exams.

In the past, students who have been successful in the course:

• Skim the textbook before each class meeting so that lecture is not the first time they see the material
• Attend every lecture and take excellent notes
• Actively work on practice problems given during class
• Complete all of the suggested practice problems for each chapter
• Finish the online homework on time
• Practice for exams as recommended
• Review and correct mistakes made during class, practice problems, homework, and exams

ALEKS Homework

You will have regular, required assignments using ALEKS, and you can expect to spend at least several hours a week working on them. Just how much time you have to spend will depend critically on how efficiently you use the ALEKS service. An introduction is posted on our course Moodle site to help you get the most from ALEKS with the least time and effort.

Prerequisite review. You are expected to enroll in CHEM 1061 with genuine mastery of a wide range of topics from either high school chemistry and math or from CHEM 1015. The goal of the prerequisite review is to determine which topics you didn’t master or have forgotten through lack of recent practice and to recover them prior to the deadline. Make sure that your score for Prerequisite Review is 100% in ALEKS learning mode in advance of the due date in order to earn full credit.

Homework A-H. You are expected to reach certain milestones in your mastery of the entire curriculum at scheduled due dates. The purpose of this is to keep you working regularly. Because assignments are available well in advance of the due date, no extensions on due dates will be granted.

Final mastery (full pie). This portion of your grade will be determined just by your overall level of mastery at the end of the course (how many topics ALEKS reports you have mastered), even if you master the skill well after the initial deadline. This should also be motivation to restore topics to your mastery list that you may have lost at reassessment.
In-Class Activities

During class meetings, we will be employing a variety of in-class activities, including (but not limited to) demonstrations, in-class writing, problem-based learning, and quizzes. These activities are designed to help you engage in the class and master the course material. All in-class activities are designed to help you master the course material and prepare for exams.

Exams

**Times.** Exams will be given on the dates listed from 9-10 pm (the Final Exam will be held from 8-10 am). **Adjust your schedule NOW, and plan any travel, weddings, employment opportunities, meetings, etc. around these dates.** All exams, including the Final Exam, will be given ONLY at the scheduled dates and times. **No make-up exams or alternative exam times** are an option under any circumstances. The Final Exam must be completed in order to earn a passing grade in the course.

**Locations.** All exam locations will be posted on the course Moodle site.

**Format.** Midterm exams will consist of multiple choice questions and one free response question and will cover material as outlined in the course calendar. The Final Exam will be cumulative and cover all material presented in the course, including any information presented after Exam 4.

**Materials for exams.** You should bring your U-Card and a pen with you. All exams are closed book and closed note, and no study aids are permitted, except those provided with the exam itself. No smart phones, cell phones, programmable calculators, or other such electronic devices may be used at any time. Only non-programmable, non-graphing calculators are allowed (see specific Calculators policy).

**Exam regrades.** Regrade requests must be submitted, in writing, directly to the instructor, within seven days of exam score posting.

**Missed exams.** In situations of a true emergency, serious illness, or University-sponsored travel, an excused absence may be granted for a midterm exam. To obtain an excused absence, students must contact the instructor as soon as circumstances allow to discuss the nature of the emergency and to arrange for documentation. The unweighted average of all the student’s other midterm exam scores will replace the zero from the excused midterm exam. Only one missed midterm exam will be replaced in this fashion. If circumstances prevent a student from taking more than one midterm exam, a meeting must be scheduled immediately with the instructor to discuss any options available.

Calculators

**Acceptable calculators.** Any one-line display calculator is allowed. The TI-30Xa is the suggested calculator for this and all CHEM 1XXX courses and for most introductory physics courses. The TI-30X IIS is an acceptable two-line calculator. These calculators are available in the U of M Bookstores. Many other two-line calculators are programmable and would therefore not be allowed. If you have any questions about your particular calculator, see your instructor immediately.

**Sharing calculators during exams.** Calculators may not be shared during exams. If you are concerned about battery failure during the exam, bring a second calculator or extra batteries with you.
Grading Policies

S/N grading. If you are registered for this class on an S/N basis, a grade equivalent to C- or above on the A-F scale will be required to earn an S, and a grade equivalent to D+ or below will earn an N. Many programs and transfer courses do not like S/N grading and will assume it represents the minimum possible grade. Monday, September 19, is the last day to change the grading basis for the semester.

Incompletes. Students who have an excused absence from the Final Exam and have taken the four midterm exams may be eligible to earn a grade of I in the course. Incompletes will not be granted if the student has missed earlier exams or if the student is not passing based on the work up to the Final Exam. This grade is NOT routinely assigned. Any grade of I must be made up the following semester. After that time, all grades of I will become grades of F. You must fill out an Incomplete Request form (available in 115 Smith Hall) and have it signed. See your instructor for details.

Withdrawals. If you decide to drop the class, you must officially withdraw from the course following the specific rules of your college. Please know that students withdrawing from the course will not have any records retained for use upon retaking the course. If you are considering withdrawing from the course for academic reasons, I urge you to come and talk with me during office hours. Your situation may not be as bad as you think it is.

Tutoring

General chemistry tutor room. General chemistry tutors are available for free on a drop-in basis during the semester in 124 Smith Hall (the schedule is posted on our course Moodle page). The tutors are there to help you learn and not to simply give you answers. The tutors are actually instructed to ask you questions that will help you understand what concept you are missing that is preventing you from solving a particular problem. Solving the problem yourself with a tutor’s guidance will enhance the depth and retention of your knowledge.

It is important to me that your time is well spent in the tutor room. If tutors are not present at scheduled times, are not helpful, or if they leave for extended periods of time, please let the Head General Chemistry TA (goffx092@umn.edu) or me know immediately.

Private tutors. A list of people available for hire as private tutors is available on our course Moodle site, if this is something you’re interested in.

Course Policies

Use of personal electronic devices in the classroom

Use of cell phones, smart phones, music devices, tablets, computers, and/or other personal electronic devices is NOT PERMITTED during class time.

Using personal electronic devices in the classroom setting can hinder instruction and learning, not only for the student using the device but also for other students in the class. To this end, the University establishes the right of each faculty member to determine if and how personal electronic devices are allowed to be used in the classroom. For complete information, please reference http://policy.umn.edu/Policies/Education/Education/STUDENTRESP.html.

Can I use my phone during class?

No. You won’t need it, and it should be put away for the entire class meeting.

Student workload expectations per undergraduate credits

For fall and spring semester, one credit represents, for the average University undergraduate student, three hours of academic work per week (including lectures, laboratories, recitations, discussion groups, field work, study, and so on), averaged over the term, in order to complete the work of the course to achieve an average grade. One credit equals 42-45 hours of work over the course of the term (1 credit x 3 hours of work per week x 14 or 15 weeks in a semester = 42 to 45 hours of academic work. Thus, enrollment for 15 credits in a term represents approximately 45 hours of work per week, on average, over the course of the term.

Can I use extra credit?

There is no extra credit in CHEM 1061.

Student mental health and stress management

As a student, you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance and may reduce your ability to participate in daily activities. University of Minnesota services are available to assist you. You can learn more about the broad range of confidential mental health services available on campus via the Student Mental Health website: http://www.mentalhealth.umn.edu.

Many international students and scholars experience difficulty during their stay in the US, and International Student and Scholar Services (www.iss.s.umn.edu) office is available to help.
Scholastic dishonesty

Scholastic dishonesty is discussed under CSE’s “Scholastic Integrity” policy (http://cse.umn.edu/services/advising/CSE_CONTENT_188716.php) and CLA’s “Classroom, Grading, and Examination Procedures” (http://advisingtools.class.umn.edu/cgep/studnetconduct.html).

You are expected to do your own academic work and cite sources as necessary. Failing to do so is scholastic dishonesty. Scholastic dishonesty means plagiarizing; cheating on assignments or examinations; engaging in unauthorized collaboration on academic work; taking, acquiring, or using test materials without faculty permission; submitting false or incomplete records of academic achievement; acting alone or in cooperation with another to falsify records or to obtain dishonestly grades, honors, awards, or professional endorsement; altering, forging, or misusing a University academic record; or fabricating or falsifying data, research procedures, or data analysis. Please see the Student Conduct Code (http://www1.umn.edu/regents/policies/academic/Student_Conduct_Code.html) for more information. If it is determined that a student has cheated, he or she may be given an “F” or an “N” for the course and may face additional sanctions from the University. For additional information, please see: http://policy.umn.edu/Policies/Education/Education/INSTRUCTORRESP.html.

In addition, to prevent copying, exam proctors may occasionally ask a student to move his or her seat or to better conceal exam materials.

Equity, diversity, equal opportunity, and affirmative action

The Department of Chemistry is united in the belief that diversity in all of its forms is good. Collaboration among people of all cultures and backgrounds enhances our experience as scientists and contributes to excellence in teaching, learning, and research. We strive to promote a climate that celebrates our differences and strengthens our department by embracing and working to increase our diversity.

The University provides equal access to and opportunity in its programs and facilities, without regard to race, color, creed, religion, national origin, gender, age, marital status, disability, public assistance status, veteran status, sexual orientation, gender identity, or gender expression. For more information, please consult Board of Regents Policy (http://regents.umn.edu/sites/default/files/policies/Equity_Diversity_EO_AA.pdf).

Student conduct code

The University seeks an environment that promotes academic achievement and integrity, that is protective of free inquiry, and that serves the educational mission of the University. Similarly, the University seeks a community that is free from violence, threats, and intimidation; that is respectful of the rights, opportunities, and welfare of students, faculty, staff, and guests of the University; and that does not threaten the physical or mental health or safety of members of the University community.

As a student at the University you are expected to adhere to Board of Regents Policy: Student Conduct Code. To review the Student Conduct Code, please see: http://regents.umn.edu/sites/default/files/policies/Student_Conduct_Code.pdf.

Note that the conduct code specifically addresses disruptive classroom conduct, which means “engaging in behavior that substantially or repeatedly interrupts either the instructor’s ability to teach or student learning. The classroom extends to any setting where a student is engaged in work toward academic credit or satisfaction of program-based requirements or related activities.”

Sexual harassment

“Sexual harassment” means unwelcome sexual advances, requests for sexual favors, and/or other verbal or physical conduct of a sexual nature. Such conduct has the purpose or effect of unreasonably interfering with an individual’s work or academic performance or creating an intimidating, hostile, or offensive working or academic environment in any University activity or program. Such behavior is not acceptable in the University setting. For additional information, please consult the Board of Regents policy: http://www1.umn.edu/regents/policies/human_resources/SexHarassment.html.

Teaching & learning

The materials provided in this course are intended only for the students officially enrolled in this section and are to be used to learn and practice the course material. Disseminating class notes, videos, exams, etc. beyond the classroom community or accepting compensation (in the form of cash or in trade, such as access to a study website) undermines instructor interests in their intellectual property while not substantially furthering instructor and student interests in effective learning. Such actions violate shared norms and standards of the academic community and are not allowed. For additional information, please see: http://policy.umn.edu/Policies/Education/Education/STUDENTRESP.html.

Academic freedom and responsibility

Academic freedom is a cornerstone of the University. Within the scope and content of the course as defined by the instructor, it includes the freedom to discuss relevant matters in the classroom. Along with this freedom comes responsibility. Students are encouraged to develop the capacity for critical judgment and to engage in a sustained and independent search for truth. Students are free to take reasoned exception to the views offered in any course of study and to reserve judgment about matters of opinion, but they are responsible for learning the content of any course of study for which they are enrolled.

* Language adapted from the American Association of University Professors “Joint Statement on Rights and Freedoms of Students”.

Disability accommodations

The University of Minnesota is committed to providing equitable access to learning opportunities for all students. The Disability Resource Center (DRC) is the campus office that collaborates with students who have disabilities to provide and/or arrange reasonable accommodations.

If you have, or think you may have, a disability (e.g., mental health, attentional, learning, chronic health, sensory, or physical), please contact DRC at (612) 626-1333 to arrange a confidential discussion regarding equitable access and reasonable accommodations.

If you are registered with Disability Resource Center and have a current letter requesting reasonable accommodations, please contact your instructor as early in the semester as possible to discuss how the accommodations will be applied in the course.

For more information, please see the DRC website, https://diversity.umn.edu/disability/.

Issues with your instructor

On occasion you may have a concern or problem regarding this course. You will find your instructor quite willing to discuss this with you. If, however, you wish to discuss it with someone other than your instructor, please contact Prof. Michelle Driessen, Director of General Chemistry, at mdd@umn.edu. She will serve as a mediator in helping to resolve the issue.
Class Schedule and Practice Problems

### Material for Exam 1: Chapters 1-4

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Material Covered</th>
<th>Review by</th>
<th>Homework Due</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Keys to the Study of Chemistry</td>
<td>1, 6, 31, 34a, 38, 40, 44, 52, 54, 60, 80b, 84</td>
<td>Review on your own</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>The Components of Matter</td>
<td>3, 37, 39, 41, 47, 50, 73, 74, 84, 90, 91, 94c, 97ab, 103ab, 109, 116, 122ab, 127a-f, 132, 144</td>
<td>Review on your own</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Stoichiometry of Formulas and Equations</td>
<td>2, 7, 14, 20a, 31, 40ac, 43, 46, 57ac, 60b, 64, 71, 74, 78, 84, 95, 120</td>
<td>Review on your own</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Three Major Classes of Chemical Reactions</td>
<td>5, 12, 19ab, 20a, 22, 24c, 28ac, 30, 32, 35, 42, 47, 63a, 66b, 73, 89, 93, 112ac, 116b, 128, 132, 139, 152ab</td>
<td>September 7-9</td>
<td>Prerequisite Review Due 11:59 pm, September 9</td>
</tr>
</tbody>
</table>

**Exam 1:** Wednesday, September 14, 9-10 pm

### Material for Exam 2: Chapters 5-6

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Material Covered</th>
<th>Review by</th>
<th>Homework Due</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Gases and the Kinetic-Molecular Theory</td>
<td>8, 10, 21bc, 36, 44, 47, 51, 54, 57, 62, 63, 65, 74, 78, 81, 98, 99, 102, 108</td>
<td>September 16-23</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Thermochemistry: Energy Flow and Chemical Change</td>
<td>8, 11, 14, 19, 28, 37, 43, 46, 49, 50, 54ac, 56, 62b, 63, 67, 73, 79b, 81, 84ac, 96c, 99</td>
<td>September 26 – October 7</td>
<td></td>
</tr>
</tbody>
</table>

**Exam 2:** Wednesday, October 12, 9-10 pm

### Material for Exam 3: Chapters 7-9

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Material Covered</th>
<th>Review by</th>
<th>Homework Due</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Quantum Theory and Atomic Structure</td>
<td>2, 7, 9, 11, 14, 20, 23, 27, 30, 31, 41, 48, 49, 51, 57, 64b, 85, 88c, 89</td>
<td>October 14-21</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Electron Configuration and Chemical Periodicity</td>
<td>11, 13, 23, 24, 31-33, 36, 40ab, 44abc, 46, 48, 54ab, 56bc, 70ac, 78, 82, 84ab, 93</td>
<td>October 21-28</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Models of Chemical Bonding</td>
<td>5, 9, 10, 13, 15, 21abc, 22, 26, 29, 31, 39, 40, 47, 49, 53, 56, 63, 64, 66, 68, 80, 89</td>
<td>October 28 – November 4</td>
<td></td>
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**Exam 3:** Wednesday, November 9, 9-10 pm

### Material for Exam 4: Chapters 10-11

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Material Covered</th>
<th>Review by</th>
<th>Homework Due</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>The Shapes of Molecules</td>
<td>8, 12, 13a, 16, 19b, 20a, 21a, 24, 33adf, 34a, 37, 39, 40b, 41bc, 46, 58, 66, 69, 72, 74, 79, 94a</td>
<td>November 11-18</td>
<td></td>
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<tr>
<td>11</td>
<td>Theories of Covalent Bonding</td>
<td>2ad, 4, 8, 12, 14, 20, 38deg, 44b, 54, 56</td>
<td>November 21-23</td>
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**Exam 4:** Wednesday, November 30, 9-10 pm

### Material for Final Exam: Chapters 1-12 and 15

<table>
<thead>
<tr>
<th>Chapter</th>
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<th>Material Covered</th>
<th>Review by</th>
<th>Homework Due</th>
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</thead>
<tbody>
<tr>
<td>12</td>
<td>Intermolecular Forces</td>
<td>3, 5, 8a, 15, 21, 23, 39, 40, 44, 48, 49, 51, 63, 79, 80, 87, 91, 96, 98, 119</td>
<td>December 2-7</td>
<td></td>
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<tr>
<td>15</td>
<td>Organic Compounds</td>
<td>17, 18, 20a, 24, 28ab, 35, 60, 61, 70b, 103d</td>
<td>December 9</td>
<td></td>
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<tr>
<td>16</td>
<td>Final Exam Review</td>
<td></td>
<td>December 12-14</td>
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**Final Exam:** Tuesday, December 20, 8-10 am