

# Chemistry 103: General Chemistry I

Spring 2020, Lecture section 001

Course site: <https://learnuw.wisc.edu>

Bookmark this course site – it is important to visit daily! It is the hub for our course and contains crucial materials for each day of class.

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## Meeting times and locations: Whole Class MWF at 2:25 – 3:15 pm in Social Sciences 6210

- Discussion sections meet at various times and locations
- Labs meet at various times and locations

**Instructors: Gil Nathanson and JR Schmidt**

### How to get help:

1. Attend Dr. Nathanson & Dr. Schmidt's office hours
  - Mondays, Wednesdays, Fridays: 1:20 – 2:10 pm in 6117 Social Sciences
  - Thursdays: 1:20 – 2:10 pm in 1201 Chemistry Building
2. Help Desk in room 1201: Free drop-in tutoring provided by current Chem 103 TA/FAs.
  - Mondays: 8:50 am – 11 am; 1:20 – 2:20 pm; 3:30 – 4:20 pm
  - Tuesdays, Thursdays: 11 am – 4:20 pm
  - Wednesdays, Fridays: 11 am – 12 pm; 1:20 – 2:20 pm; 3:30 – 4:20 pm

Preferred contact for personal or confidential matters:

use email [nathanson@chem.wisc.edu](mailto:nathanson@chem.wisc.edu) and [schmidt@chem.wisc.edu](mailto:schmidt@chem.wisc.edu)

Use Piazza for all course content and technology questions.

Teaching Assistants: *use email to set up appointments*

Name	Email	Sections	
Belson, Ryan	<a href="mailto:rbelson@wisc.edu">rbelson@wisc.edu</a>	609	610
Czerwinski, Rachel	<a href="mailto:rczerwinski@wisc.edu">rczerwinski@wisc.edu</a>	601	602
Hilbrands, Adam	<a href="mailto:hilbrands@wisc.edu">hilbrands@wisc.edu</a>	603	604
Michael, Katelyn	<a href="mailto:khmichael@wisc.edu">khmichael@wisc.edu</a>	613	614
Moreno, David	<a href="mailto:dmoreno6@wisc.edu">dmoreno6@wisc.edu</a>	611	612
Tigges-Green, Iszie	<a href="mailto:tiggesgreen@wisc.edu">tiggesgreen@wisc.edu</a>	605	606
Wu, Wenxin	<a href="mailto:wwu255@wisc.edu">wwu255@wisc.edu</a>	607	608

Official course description:

*Introduction. Stoichiometry and the mole concept, the behavior of gases, liquids and solids, thermochemistry, electronic structure of atoms and chemical bonding, descriptive chemistry of selected elements and compounds, intermolecular forces. For students taking one year or more of college chemistry; serves as a prerequisite for Chem 104; lecture, lab and discussion.*

Official requisites: *Suitable math placement score or completion of Math 112, Math 114, Math 171 or equivalent; not open to students who have taken CHEM 109 or 115*

Course designations and attributes:

- Level: Elementary
- Breadth: Physical Science
- L&S Credit type: C

Instructional mode: Chemistry 103 is taught in a “blended” learning environment, meaning students interact with course content, instructors, and peers via in-person classroom time and online learning and engagement platforms.

How credit hours are met: Chemistry 103 is a 4-credit course. In-person contact time per week includes 150 minutes of whole-class session meetings, 50 minutes of discussion meetings, and (most weeks) 180 minutes of laboratory. Online work per week includes approximately 3 hours of pre-class and lab preparatory work, 3 hours of post-class homework, and up to an additional 6 hours problem solving and exam study time. During the course of the semester, students are expected to engage with the course learning activities for a total of about 180 hours.

## Why take Chemistry 103?

Chemistry is the science of making things and transforming things. Chemistry is often called the central science because it connects so strongly to other sciences, among them physics, biology, engineering, medicine, materials science, and pharmacology. Chemistry 103 will meet a prerequisite requirement for many fields of study and careers. You will have an opportunity through Chemistry 103 to gain a new understanding of the complex world around you, and you will begin to how the many elements of the periodic table serve as building blocks of every substance and every process on earth and beyond.

## How does this course fit with your preparation for your major?

Chemistry 103 is the first course in a two-semester General Chemistry sequence. The second course is Chemistry 104. Students who take Chemistry 103 should also plan to take Chemistry 104. The 103-104 sequence serves as a prerequisite for advanced courses such as Organic Chemistry and Analytical Chemistry and is required by many other majors (such as engineering, many biological and agricultural sciences, pre-health professions, and L&S breadth requirements).

## Chemistry 103 goals and course objectives

We want you to learn to think like a chemist. With that in mind, this course has been designed and organized to help you learn chemistry. We will do our best to guide you, but no course or instructor can learn for you. Successful students are proactive about their learning and establish patterns of study.

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We have two overarching goals for our chemistry program: 1) You will conceptualize the invisible by understanding the atomistic model of matter and the role of energy in transformations, and 2) you will operate as a scientist by learning how to think logically, communicate effectively, and solve problems methodically.

By the end of Chemistry 103, you will:

1. Describe fundamental chemical concepts and principles, including: measurement, characterization of the phases of matter, properties of atoms and ions, stoichiometry and thermochemistry of chemical reactions, kinetic molecular theory, the nature of energy, chemical bonding and molecular geometry, and intermolecular forces.
2. Solve a wide variety of integrative chemistry problems that connect ideas across topics, such as the evaluation of the impact of different fuels on the environment.
3. Apply models of atoms, molecules, and their interactions to explain the physical and chemical macroscopic properties of gases, liquids and solids.
4. Visualize and apply chemical and mathematical models to rationalize the organization of the periodic table, to predict molecular geometry, to explain chemical reactivity, and to calculate energy flow in chemical processes.
5. Design, conduct, and analyze experiments pertaining to stoichiometry, thermochemistry, and spectrometry while developing fundamental safety, measurement, and sample isolation techniques.
6. Demonstrate growth as reflective, self-directed learners through assessing their work, identifying misconceptions, and critically evaluating information from a variety of sources.
7. Articulate the rationale behind experimental results and answers to conceptual problems in verbal communications and written assessments using scientifically appropriate language.

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## Chemistry 103 learning environment

As partners in learning, we all have responsibilities for every class period. We have prepared an interactive and engaging set of activities for which your pre-session preparation is critical. Each component is important for your success. Do not overlook any of them.

We know that success in this course depends upon your ability to solve problems. Developing your problem-solving skill is a key aim of this course. We will give you a lot of opportunities to practice problem solving. The most successful students devote most of their study time to problem solving. We advise you to practice problem solving every day. In emphasizing problem-solving skills, we aim to cultivate your ability to connect these problems to broader chemistry concepts.

We promise that by the end of Chemistry 103, you will be a more mature learner, a stronger thinker, and have a much better grasp of how to think like a chemist. To be successful in Chemistry 103, you must learn to be an independent learner and problem solver.

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## Course resources

We have chosen course materials that best address the learning objectives and that are the most useful resources to you in your study, lab, and group work. There are seven total materials: one textbook (*Chemistry, The Molecular Science 5th Edition* (2015), by Moore and Stanitski), one lab manual, one lab notebook, safety goggles, Top Hat, a calculator, and OWL online homework access. These items will cost you roughly \$200. These items are essential for your learning, and we have negotiated with the publishers to receive highly discounted textbook pricing. Please contact us if you cannot afford these items. **Please see Module 0 on our course site** for a list of the materials and options for purchasing the textbook/homework at a significant discount: <https://learnuw.wisc.edu>.

## Chemistry 103 schedule

A link to our course schedule, including exam dates, can be found on the course site under “Semester Schedule” and in Module 0. You must report any religious conflicts with exams or laboratory exercises to your TA/FA within the first two weeks of classes.

## Evaluation of your learning

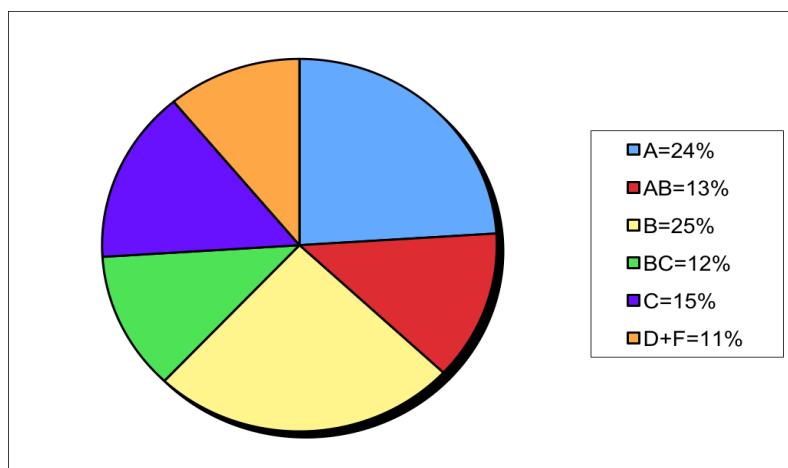
Your scores are always available to you at our Learn@UW course site. There are no opportunities for extra credit.

**You must successfully complete the laboratory assignments to receive a passing grade in this course.**

ACTIVITY	POINTS CALCULATED	PERCENTAGE OF GRADE
<b>Skill Building</b>		<b>17.3%</b>
Pre-class assignments: 5 points per week	60 (of 70 possible points; drop lowest 2 weeks)	6.0%
Post-class online OWL homework: 6 points per week	78 (of 84 possible points; drop lowest 1 week)	7.8%
Top Hat questions in whole-class session	30 (30 points awarded for full credit; full credit = 80% correct of all Top Hat questions)	3.0%
Discussion attendance	5 (5 points awarded for full credit; full credit = attending 24 of 28 discussion sessions)	0.5%
Discussion packets	N/A	0.0%
Practice exams	N/A	0.0%
<b>Demonstrations of Understanding</b>		<b>82.7%</b>
Surveys & Concept Inventory: 7 activities @ 1 pt each	7	0.7%
Quizzes (in discussion sections): 8 quizzes @ 20 pts each	140 (of 160; drop lowest quiz score)	14%
Laboratory: 8 labs @ 10-20 pts each	150	15%
Exams: 3 exams @ 110 pts each	330	33%
Final exam	200	20%
<b>Total</b>		<b>100%</b>

## Grade scale

The approximate distribution of final grades is given below. It is important to note that the distribution will be adjusted upwards if class performance exceeds our expectations. For example, approximately 24% of the grades will be A, and it may be higher.



## Expectations in our learning environment

Chemistry 103 is a fun and enlightening course, and we enjoy teaching it. We owe each other professional behavior and mutual respect. Your instructors will model expected behavior, and we will devote time and energy to helping you succeed in this class and to providing you opportunities to practice chemistry problem solving. In return, you will need to be engaged, present, and active in this environment. Make notes about questions you have or points you don't understand. Come to us with your questions and struggles with the material; that's why we're here. **To succeed, you must practice chemistry problem solving every day! Please be prepared to commit 8 to 12 hours outside of class each week toward this effort.**

See [Module 0](#) on our course site for more information on course expectations and helpful tips for maximizing your learning.

## Course and UW-Madison policies

### Academic Integrity

We expect all students to conduct themselves with honesty, integrity, and professionalism. Remember that it is not ok to simply copy and paste material from the Web or from another student into your own work. The Writing Center describes how to cite material that is not yours: <http://writing.wisc.edu/Handbook/QuotingSources.html>. Passing off someone else's lab reports or exam answers as your own work is academic misconduct. Asking a student to "click" concept test responses for you when absent from class is also academic misconduct. Such behavior is not tolerated and is grounds for a failing grade in this course. To learn more about university policies on academic misconduct, see <http://www.students.wisc.edu/doso/academic-integrity/>.

## Reasonable Accommodations

The University of Wisconsin-Madison supports the right of all enrolled students to a full and equal educational opportunity. The Americans with Disabilities Act (ADA), Wisconsin State Statute (36.12), and UW-Madison policy (Faculty Document 1071) require that students with disabilities be reasonably accommodated in instruction and campus life. Reasonable accommodations for students with disabilities is a shared faculty and student responsibility.

Students are expected to inform their instructor of their need for instructional accommodations by the end of the third week of the semester, or as soon as possible after a disability has been incurred or recognized. We will work either directly with you or in coordination with the McBurney Center to identify and provide reasonable instructional accommodations. Disability information, including instructional accommodations as part of a student's educational record, is confidential and protected under FERPA.

## Make-up Policy for Exams, Quizzes, Top Hat, and Labs

We recognize that students sometimes encounter situations beyond their control or have conflicts with scheduled course activities. If you have an excused absence that you know about in advance, please contact your instructor and Teaching Assistant immediately to make accommodations. In the case of an unforeseen illness or emergency, please email as soon as possible. The following is what will occur depending on which activity you miss.

- **Exams:** Depending on the circumstances of an excused absence (see above), we will either give a make-up exam or replace the score with the average of your other mid-term exams. There is no make up for the final exam. An "Incomplete" will appear on your transcript instead of a letter grade until you complete the work the following semester.
- **Quizzes:** There are no make-up quizzes. The score of a missed quiz for an excused absence will be substituted with the average of your other quizzes.
- **Top Hat:** Students who correctly answer 80% of the Top Hat questions earn full credit. We have this 20% buffer to accommodate excused absences.
- **Lab Attendance policy:** You must attend all laboratory sessions. There is no opportunity to make up a lab that you miss for unexcused reasons (see below). A grade of zero will be recorded for unexcused absences. Below are specific attendance details:
  - **Late attendance:** Any student showing up to lab 30 minutes late or later is not allowed to participate in lab. This is considered an unexcused absence and students are not allowed to make this up.
  - **Unexcused labs:** Any student missing a lab because of late arrival or not showing up at all will NOT have the opportunity to make this up. You may not reschedule a lab period simply to fit your personal schedule. Make-up labs are not scheduled. Exceptions to this policy are made only in unusual circumstances and are at the discretion of the Lab Director.
  - **Excused labs:** Students who must miss labs due to University reasons (UW varsity athletics or band) should arrange for a time with their instructor two weeks prior to their scheduled lab date to make up the lab. Students who must miss labs for personal emergencies or illness should contact their TA and instructor as soon as possible to discuss how they can make up the lab. Students who must miss a lab for religious observance should contact their TA and instructor as soon as possible to discuss how they can make up the lab. Students who have more than one excused absence may need to complete lab work in a subsequent semester before successfully completing the course.
  - **Late lab reports:** Unless otherwise announced, reports for wet labs are due to TAs/FAs at the end of the lab session, before students leave the lab.

## Communications

Your Chemistry 103 instructors are dedicated to maximizing your learning experience. We rely heavily on you to take the initiative in coming to seek our help. After the first week of class, we will post a list of all TA/FA office hours, and we encourage you to attend Chem 103 Help Desk hours (listed on our course site).

### Email

In order to help bring your email to our attention, please include **Chemistry 103** in the subject line of all email messages that you send us. Email should be limited to logistical questions, concerns about grades, requests for alternate office hours, or any non-content related course questions. Content questions should be directed to Piazza or discussed at your instructor's/TA's office hours.

[More policies, expectations, and details in Module 0 on our course site.](#)

## Student contract

I have read the syllabus and understand the expectations of this Chemistry 103 learning environment. I understand that I am expected to contribute to a productive atmosphere, to show respect to my peers, to be responsible for my work and my preparation for deadlines, and to ask for clarification when I need it. I expect to participate fully in an engaging learning experience in Chemistry 103 and to optimize the learning opportunities available to me. Finally, I will contribute to positive classroom etiquette by:

- 1) being seated before the bell rings,
- 2) refraining from packing up until after the class is over, even if the bell has rung (this will not happen often), and
- 3) using my phone for Top Hat only during class, not texting or checking my phone for other reasons.

[You will be asked to agree to this contract in Module 0 on our course site.](#)

## Chemistry 103 Topics and Schedules

A list of modules, assigned readings, and laboratory experiments for all Chemistry 103 sections is provided here. More specific details and dates for modules and assignments can be found on the course websites.

Module Number	Module Title	Number of Class Periods	Assigned Readings (textbook and online)
1	Introduction and Measurement	2	Chapter 1, PDF readings
2	Atoms, Elements, Molecules and Ions	3	Chapters 1, 2
3	Chemical Reactions	3	Chapter 3
4	Energy and Stoichiometry	4	Chapters 2-4; PDF readings
5	Gases	3	Chapter 8; PDF readings
6	Thermochemistry	5	Chapter 4; PDF readings
7	Light, Matter, and Atomic Structure	6	Chapter 5; PDF readings
8	Chemical Bonding	3	Chapter 6
9	Molecular Geometry	4	Chapter 7
10	Intermolecular Forces	3	Chapter 9
11	Phase Diagrams and Solids	3	Chapter 9

### *Laboratory Experiments*

Citizenship in the Lab  
Solutions, Density, and Graphing  
Reaction Types and Chemical Logic  
Zinc and Iodine  
Synthesis of an Alum  
Solution Calorimetry  
Light, Color, and Solutions  
Molecular Geometry and WebMO  
Project Lab



**Chemistry 103**

Section 1

 Dr. Gil Nathanson ([nathanson@chem.wisc.edu](mailto:nathanson@chem.wisc.edu))

 Dr. JR Schmidt ([schmidt@chem.wisc.edu](mailto:schmidt@chem.wisc.edu))

Spring 2020

week	date	Whole Class Meeting Topic	Quiz (in Disc A)	Lab
1	W 22-Jan	Module 1: Introduction to Chemistry Concepts (day 1)	no quiz	No Lab
	F 24-Jan	Module 1: Introduction to Chemistry Concepts (day 2)		
2	M 27-Jan	Module 2: Atoms, Molecules, and Ions (day 1)	no quiz	Citizenship in the Lab
	W 29-Jan	Module 2: Atoms, Molecules, and Ions (day 2)		
	F 31-Jan	Module 2: Atoms, Molecules, and Ions (day 3)		
3	M 3-Feb	Module 3: Chemical Reactions (day 1)	Quiz 1	Solutions, Density, and Graphing
	W 5-Feb	Module 3: Chemical Reactions (day 2)		
	F 7-Feb	Module 3: Chemical Reactions (day 3)		
4	M 10-Feb	Module 4: Energy and Stoichiometry (day 1)	Quiz 2	Reaction Types and Chemical Logic due Fri, Feb 14 in WC
	W 12-Feb	Module 4: Energy and Stoichiometry (day 2)		
	F 14-Feb	Catch Up and Review		
5	<b>M 17-Feb</b>	<b>Exam 1: Modules 1-4, Labs</b>	no quiz	No Lab
	W 19-Feb	Module 4: Energy and Stoichiometry (day 3)		
	F 21-Feb	Module 5: Gases (day 1)		
6	M 24-Feb	Module 5: Gases (day 2)	Quiz 3	Zinc and Iodine
	W 26-Feb	Module 5: Gases (day 3)		
	F 28-Feb	Module 6: Thermochemistry (day 1)		
7	M 2-Mar	Module 6: Thermochemistry (day 2)	Quiz 4	Solution Calorimetry due Mon, Mar 9 in WC
	W 4-Mar	Module 6: Thermochemistry (day 3)		
	F 6-Mar	Module 6: Thermochemistry (day 4)		
8	M 9-Mar	Catch Up and Review	no quiz	No Lab
	<b>W 11-Mar</b>	<b>Exam 2: Modules 5-6, Labs</b>		
	F 13-Mar	Module 7: Light, Matter, and Atomic Structure (day 1)		
<i>Spring Break</i>				
9	M 23-Mar	Module 7: Light, Matter, and Atomic Structure (day 2)	Group Quiz 1	Synthesis of an Alum
	W 25-Mar	Module 7: Light, Matter, and Atomic Structure (day 3)		
	F 27-Mar	Module 7: Light, Matter, and Atomic Structure (day 4)		
10	M 30-Mar	Module 7: Light, Matter, and Atomic Structure (day 5)	Quiz 5	Light, Color, and Solutions
	W 1-Apr	Module 7: Light, Matter, and Atomic Structure (day 6)		
	F 3-Apr	Module 8: Chemical Bonding (day 1)		
11	M 6-Apr	Module 8: Chemical Bonding (day 2)	Quiz 6	Web MO and Molecular Geometry due Fri, Apr 10 in WC
	W 8-Apr	Module 9: Molecular Geometry (day 1)		
	F 10-Apr	Module 9: Molecular Geometry (day 2)		
12	M 13-Apr	Catch Up and Review	no quiz	No Lab
	<b>W 15-Apr</b>	<b>Exam 3: Modules 7-9, Labs</b>		
	F 17-Apr	Module 10: Intermolecular Forces (day 1)		
13	M 20-Apr	Module 10: Intermolecular Forces (day 2)	Group Quiz 2	Project Lab
	W 22-Apr	Module 11: Phases Diagrams and Solids (day 1)		
	F 24-Apr	Module 11: Phases Diagrams and Solids (day 2)		
14	M 27-Apr	Module 11: Phases Diagrams and Solids (day 3)	Quiz 7	No Lab
	W 29-Apr	Module 11: Phases Diagrams and Solids (day 4)		
	F 1-May	Catch Up and Review		
<b>Comprehensive Final Exam (Modules 1-11, Labs) on Monday, May 4 at 5:05 pm</b>				