GENERAL CHEMISTRY I (CHEM 101 – 004)

Instructor: Dr. Thomas Freeman **Class meeting:** TR 9:30-10:45 am in MY G202
Course Website: sakai.unc.edu **Prerequisite:** Math 110 or higher

HOW TO CONTACT DR. FREEMAN

Questions about chemistry?

Bring them to a Q&A session. (Times and locations subject to change)

Tu 11:00 am-12:00 pm (Mentors, Room TBA)
W & Th 5:00-6:00 pm (Dr. Freeman, room TBA)

Questions about logistics and course success?

Visit me during office hours (Kenan C147A). If you wish to discuss an exam grade, print and complete a self-assessment form on Sakai before coming by.

Drop-in Office Hours
M & Tu 1:30-3:00 pm
Appointment-only Office Hours
W & Th 2:00-4:00 pm
(Appointments may be made at other times and days as needed)

Email

Many in-person opportunities for help will be provided, but Dr. Freeman has limited availability by email. **No chemistry content questions will be answered by email.**

If you must email Dr. Freeman (freeman@unc.edu):

1. Include "CHEM101" and a one-word description in the subject line (*e.g.,* CHEM101 clicker)
2. Keep your message brief and direct. (≤ four sentences)

COURSE MATERIALS

- **Required texts:**
  - *Chemistry: The Central Science* (Brown, *et al*., 12th Ed.)
  - *Chemistry: A Guided Inquiry* (Moog and Farrell, 6th Ed.)
- **Required materials:**
  - i>clicker 2 student remote (*i.e.,* clicker)
  - ALEKS subscription (see details in "Getting Started" and "ALEKS introduction")
  - Non-graphing/non-programmable scientific calculator (*e.g.*, TI-30)
- **Optional materials:**
  - Student solutions manual

COURSE DESCRIPTION

Chemistry 101 is the first half of a yearlong overview of the exciting field of chemistry, the study of changes in matter and energy. Students will be exposed to many new concepts, techniques and phenomena including, atomic and molecular structure, stoichiometry, conservation of mass and energy, and thermochemical changes.

COURSE GOALS

After taking this course, students should be able to:

- Collaborate effectively within a group (teamwork)
- Explain chemical phenomena in conceptual terms (*e.g.,* why does iron rust, but zinc does not?)
- Develop and apply quantitative problem-solving strategies to chemistry problems (*e.g.*, how much heat is generated when a liter of gas is burned?)

COURSE FORMAT

This course is designed under the guiding principle that the person doing the most work does the most learning. Therefore, the goal is to have the student actively participating in the learning experience. One of the most effective methods of active learning is POGIL (Process-Oriented Guided Inquiry Learning). In a POGIL course, the students learn through a series of engaging activities designed to guide them through an in-depth exploration of a chemical concept. You will work in groups of four where each member has a predefined role (*i.e.*, manager, recorder, spokesperson, and reflector). My role in this is as a facilitator to help guide you in this exploration. This is a proven and effective learning method that can also be a lot of fun. Additionally, an online tutoring system, ALEKS (Assessment and LEarning in Knowledge Spaces) will be used outside of class as a tool to help you master every learning objective in this course (see more on ALEKS handout). Because class participation is the primary mode of learning, it is crucial that you complete the preparatory assignments, and show up to class on time. Preparatory assignments will include reading selections from the main text, watching videos, and completing ALEKS objectives. A brief daily quiz will be given at the beginning of each class meeting to assess preparation for the in-class activity (except on exam days). Using ALEKS for practice, and reviewing the in-class POGIL activities are crucial study tools for your exams.

COURSE POLICIES

ELECTRONIC DEVICES IN CLASS:

The only electronic devices allowed in class are the i>clicker 2 remote and a scientific calculator. Use of other electronic devices such as phones, laptops, tablets, *etc.* is strictly forbidden. If you violate this policy you will first be warned, then asked to hand over the device, and finally asked to leave the classroom.

ACADEMIC HONESTY AND THE UNC HONOR CODE:

While this course heavily encourages collaborations, you must **only collaborate when explicitly instructed to do so**. The student-led Honor System is responsible for adjudicating any suspected violations of the Honor Code and all suspected instances of **academic dishonesty will be reported to the honor system**. Information, including your responsibilities as a student is outlined in the Instrument of Student Judicial Governance (http://studentconduct.unc.edu/honor-system). Your full participation and observance of the Honor Code is expected.

ATTENDANCE AND DAILY WORK:

Because in-class participation is a critical part of the learning experience in this course, attendance is required. Daily quizzes and in-class responses to questions comprise a significant portion of your grade, thus excessive absences will have a strong impact on your final grade. Points from these daily exercises cannot be made up under any circumstances, therefore, you must show up to class on-time every day for best results.

MAKE-UP EXAMS:

Exam make-ups are only allowed for excused absences with verifiable evidence (*e.g.,* medical emergency, University field trip). These will be handled on a case-by-case basis.

EVALUATION

Daily work (75 points, 15%):

Daily work includes several activities including quizzes, classwork, homework, and online activities that each count toward your final score for a total of 15% (75 points). There will be many more opportunities to earn points than will count toward your final score (*i.e.*, I will offer at least 325 points through the activities listed below during the semester, but you can only earn a maximum of 300). These points will be scaled down to 75 points for the final.

- *ALEKS:* The two factors that determine your ALEKS score are Objective completion (these have due dates listed in ALEKS) and overall Pie Mastery (how many skills have you mastered by the end of the semester). These points will make up roughly 50% of your daily work points.
- *Group quizzes (answered individually using clickers):* One to three questions (1 pts each) **based on preparatory assignments and previously covered material** will be given at the beginning of each class period (not on exam days). *These points cannot be made up under any circumstance.*
- *Class participation:* You will be periodically assessed on your group progress throughout the class meeting via clicker questions. Simply answering these questions will earn you 0.5 points, while a correct answer earns and additional 0.5 points. You may only earn up to 6 points in a given class meeting. *These points cannot be made up under any circumstance.*
- *Group evaluations:* Periodically you will be required to rate the contributions and effort of each of your group members (including yourself). These are worth up to 5 pts each (based on your avg. rating).

Exams and final (425 points, 85%):

Throughout the semester there will be three hour-long exams, and a final exam. Because chemistry is cumulative, you will likely see several concepts repeated from previous exams. This is designed to help ensure that you avoid the mistake of cramming and forgetting and will help you learn chemistry much better. The hour-long exams are worth 100 points and the final exam is worth 125 points, totaling 425 points (85% toward final score). **Your final exam date is: Tuesday, December 9, at 8:00 am in MY G202.**

Grading

Scoring system:

Item	Max points possible	Adjusted Value	% Breakdown
Daily work	300 points	75	15%
Exams 1-3	3 x 100 points	300	60%
Final Exam	125 points	125	25%
Total Possible Points		500	100%

Grade scale:

Grade ranges for the class may be extended at the instructor's discretion, but **guaranteed minimum values** for letter grades are listed below.

Percentage score (equivalent points)	Course grade	Percentage score (equivalent points)	Course grade
93.0 — 100 (465-500)	A	73.0 — 76.9 (365-384.5)	C+
89.0 — 92.9 (445-464.5)	A-	69.0 — 72.9 (345-364.5)	C
85.0 — 88.9 (425-444.5)	B+	65.0 — 68.9 (325-344.5)	C-
81.0 — 84.9 (405-424.5)	B	60.0 — 64.9 (300-324.5)	D
77.0 — 80.9 (385-404.5)	B-	<60 (<300)	F

KEYS TO SUCCESS

- ***Stay Organized*.** A three-ring binder will be a very helpful tool in this class. You will receive notes and exercises in many different forms (your text, online videos, lecture notes, in-class activities, etc.). A binder is a great way to keep these many different forms of learning materials collected and organized.
- ***Come to class prepared***. Complete all preparatory assignments (reading, videos, ALEKS, *etc.*) *before* coming to class. Come to class ready to engage in group discussions and complete in-class activities.
- ***Do the recommended practice problems.*** At a minimum, complete all the 'red' problems in your text. You have access to the solutions to these in the Student Solutions Manual. Solutions to the 'black' problems can be viewed during Q&A sessions in the Resource Center (Kenan 143). *Only check your answers after you have completed a large batch of questions.* **A good study session feels like a hard workout;** expect to be tired afterward.
- ***Attend Q&A sessions.*** We will always have something interesting to do/learn. Bring your questions and be prepared to listen to the questions of other students.
- ***Be a good class citizen*.** Be kind to your classmates and treat them with respect. Try not to distract your classmates with off-topic conversation. **Switch off all electronic devices other than your clicker (computers, cell phones, tablets, *etc.*) while in class.**
- ***Form a study group.*** Working with a study group outside of class will help you learn the material deeply. Your in-class working group is a great place to form these connections. Exchange contact information and follow up – *call/text/email others and ask if they want to study together.*
- ***Use electronic resources*.** ALEKS is the primary online tutoring system where you can practice any objective as much as you want. Doing so is a great way to prepare for in-class multiple choice assessments. Google can provide a wealth of extra practice problems *once you have exhausted those in your textbook and on ALEKS.*
- ***Get extra help if you need it.*** And get help as soon as possible! There are three venues for free tutoring.
    - Resource Center in Kenan 143. Tentative hours are Monday–Thursday 2–7 pm.
    - Peer Tutoring Program in Dey Hall. Upperclassman offer one-on-one tutoring. Times and days TBA.
    - The Learning Center also coordinates free tutoring by appointment. http://learningcenter.unc.edu/services/Math%and%Science/tutoring-for-math-and-sciences

COURSE CONTENT & GUIDE

To ensure that you are prepared for each class meeting please **check Sakai for the most updated information**. Below is a brief summary table of the tentative course calendar. A more detailed listing of every class meeting including planned learning objectives, and what you will need to do before coming to class is posted on Sakai.

Typical class meeting routine:

1. Prep for class by using ALEKS, reading, and/or watching videos on class topic
2. Take a short clicker quiz at the beginning of class
3. Listen to a brief introduction on the topic
4. Get in assigned groups and begin POGIL activity

Tentative class schedule

Date	POGIL	ALEKS/Text Sections	
T Aug-19		1.1-1.6	Intro to chemistry and measurement
R Aug-21	1-2	2.3-2.4	The atom, atomic number, and atomic mass
T Aug-26	2-3	2.4	Coulombic potential energy
R Aug-28	28-29	2.7-8.1	The mole & Chemical equations
T Sep-02	29, 31	3.1-3.3	Empirical Formula
R Sep-04	31	3.4-3.5	
T Sep-09		**Review**	
R Sep-11		**Exam I**	
T Sep-16	32, 30	3.6-4.3	Molarity & Limiting reagent
R Sep-18	30, 42	4.1-4.3	Acids and bases
T Sep-23	42, 48	4.4-4.6	Redox reactions
R Sep-25	48-49	5.1-5.2	Oxidation numbers
T Sep-30	49, 34	5.3-5.4	Thermodynamics
R Oct-02	34	5.5-5.6	Enthalpy and calorimetry
T Oct-07	35	5.7-5.8	Enthalpy changes in reactions
R Oct-09		**Review**	
T Oct-14		**Exam II**	
R Oct-16		**NO CLASS**	**FALL BREAK**
T Oct-21	7, 4	6.1-6.4	Electromagnetic radiation & The shell model (I)
R Oct-23	4-5	6.5-6.7	The shell model (II)
T Oct-28	6, 10	6.8-6.9	Atomic size & electron configurations
R Oct-30	10-11	7.2-7.4	Periodicity of electron configurations
T Nov-04	13-14	7.5-8.1	Lewis structures (I) & Bond order and bond strength
R Nov-06	15-16	8.3-8.5	Lewis structures (II-III)
T Nov-11	17-18	8.6-8.8	Lewis structures (IV) & Molecular shapes
R Nov-13		**Review**	
T Nov-18		**Exam III**	
R Nov-20	19-20	9.2-9.3	Hybrid orbitals & Avg. valence electron energies
T Nov-25	21-22	9.5-9.8	Partial charge & Molecular bonds
R Nov-27		**NO CLASS**	**THANKSGIVING**
T Dec-02	23		Dipole moment