

## Application for CHEM 1211 - Honors General Chemistry I

*Email this application as a single PDF file to Prof. Steele at ryan.steele@utah.edu  
Review of applications will begin **July 15** but will be accepted until enrollment is full*

### Course Information

CHEM 1211 is the Honors Section of General Chemistry and requires the lab course (CHEM 1240) as a co-requisite. The lecture section will be taught by Prof. Ryan P. Steele, and the lab section will be taught by Dr. Sushma Saraf. Students are also encouraged (but not required) to additionally complete the online Preparation for General Chemistry CHEM 1208 course prior to the fall semester.

Lecture section meets M,T,W,Th,F, 9:40-10:30am (M/T/Th: HEB 2006, W/F: CSC 208)

Co-Requisite CHEM 1240 – Honors General Chemistry Lab I (CSC 105)

The “lab lecture” meets M 2:00-2:50pm (CSC 208), and the lab itself meets T or W or Th 12:55-3:55pm (CSC 105)

---

### Student Information

Name: \_\_\_\_\_ ID# \_\_\_\_\_

Major: \_\_\_\_\_ Upcoming Year at U (circle): 1 2 3 4 5+

Are you a member of the Honors College? (circle) Yes No I will join this year.

Please rank your preferred laboratory times by circling your choices (1 = highest preference):

Tuesday	12:55-3:55pm	1 2 3
Wednesday	12:55-3:55pm	1 2 3
Thursday	12:55-3:55pm	1 2 3

Please provide any of the following information that is applicable to you:

SAT scores: Reading/Writing \_\_\_\_\_ Mathematics \_\_\_\_\_

ACT scores: Math \_\_\_\_\_ Science \_\_\_\_\_ English \_\_\_\_\_ Reading \_\_\_\_\_ Writing \_\_\_\_\_

Overall high school GPA: \_\_\_\_\_ (out of \_\_\_\_\_)

Name and city of high school: \_\_\_\_\_

Name of high school chemistry instructor: \_\_\_\_\_

High school courses passed (circle all that apply, and provide an Advanced Placement score, if appropriate):

Algebra		Biology	AP ____
Geometry		Chemistry	AP ____
Pre-Calculus		Physics	AP ____
Calculus I	AP (A/B) ____	Botany	
Calculus II	AP (B/C) ____	Biochemistry	AP ____
Calculus III		Computer Programming	
Other math:	_____	Other science:	_____

**Explain why you would like to join the Honors section of General Chemistry:**

## Problems

Write your answer in the space provided. If you do not know the answer, respond "unknown".

1. Sketch the Lewis structure and molecular structure of the  $SF_4$  molecule. Provide the name of its molecular shape.

2. Simplify the following expressions:

(a)  $2^8 =$  \_\_\_\_\_ (b)  $10^{-3} =$  \_\_\_\_\_

(c)  $e^2 e^3 =$  \_\_\_\_\_ (d)  $\sqrt{10^8} =$  \_\_\_\_\_

3. Solve for the indicated variable:

(a)  $3x = 72$       $x =$  \_\_\_\_\_ (b)  $\log_{10} x = -1$       $x =$  \_\_\_\_\_

(c)  $4xy = 17y^2$       $x =$  \_\_\_\_\_ (d)  $\sin(x) = 0$       $x =$  \_\_\_\_\_

4. Determine the result of the following expressions:

(a)  $\sin\left(\frac{\pi}{2}\right) =$  \_\_\_\_\_ (b)  $\left[\cos\left(\frac{\sqrt{2}}{2}\right)\right]^{-1} =$  \_\_\_\_\_

(c) The  $(x, y)$  coordinates of  $\theta = 150^\circ$  on the unit circle are \_\_\_\_\_ .

5. Determine the result of the following expressions:

(a) The  $(x, y)$  vector  $(1, 2)$ , when rotated 90 degrees counterclockwise, becomes \_\_\_\_\_.

(b) The  $(x, y, z)$  vector  $(0, 2, 1)$ , when reflected through the  $xz$  plane, becomes \_\_\_\_\_.

6. A load of garden mulch, with a volume of 4.0 cubic yards, is delivered to your home. In cubic inches, what is the volume of this delivery?

Volume = \_\_\_\_\_  $in^3$

7. The drive from Salt Lake City, UT to Denver, CO is 525 miles by interstate highway. At an average speed of 65 miles per hour—and without bathroom breaks—how many minutes would this drive take?

Time = \_\_\_\_\_ minutes

8. A diatomic nitrogen molecule—the dominant component in air—has a mass of  $4.65 \times 10^{-26}$  kg. At room temperature, its average speed is 515 m/s. In SI units, determine the average momentum of  $N_2$ .

Momentum = \_\_\_\_\_

9. In the elementary chemical reaction  $A \rightarrow B$ , the rate of the reaction depends on the concentration of species  $B$ , denoted  $[B]$ , as \_\_\_\_\_. (Select one answer.)

(a)  $\frac{d[B]}{dt}$      (b)  $-[B]$      (c)  $[B]^2$      (d) 0     (e)  $[B](t)$

10. A combustion reaction drives most modern automobile engines. Is the combustion of octane (gasoline) exothermic, endothermic, or cannot be determined? In one complete sentence, explain your reasoning.