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Chemistry 221

Michael A. Russell, Ph.D.
Professor of Chemistry
Mt. Hood Community College

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Chemistry 221

How To Contact Me: *(listed on syllabus)*

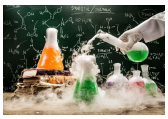
email: mike.russell@mhcc.edu *best method!*
website: http://mhchem.org/221
Discord: https://discord.gg/XrumtbY
office hours: **MWF** 10 - 11 AM *and*
WF noon - 1 PM

Introduce Yourself! Let me know who you are!
Know what lab section you are!

Chemistry 221 on Twitter
twitter.com/mhchem

Chemistry 221 on Facebook
facebook.com/mhchem

CH 221: Lectures, Labs etc.



Lectures: **MWF** from **9 AM - 9:50** in **AC 1303** *(Sec 01 only)*
- Lectures recorded, available shortly after
- Lecture notes to print available (under "Problem Sets and Handouts", mhchem.org/221), also in Companion

Labs: **Friday 1:10 - 5 PM** *(sec 01)* or **Wednesday 1:10 - 5 PM** *(sec H1)*
- **Start** in **room AC 2501** (this room)
- Move to **AC 2507** ("the lab") around **3 PM**
- *For first day*, **bring a printed copy of the "Eight Bottles" Lab** (mhchem.org/221) and your **calculator**
- Some labs will require safety glasses (Dollar store ok)

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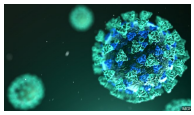
COVID and the MHCC Campus



Each time you visit the MHCC Campus (for labs, lectures, etc.) **you must:**

- **complete the COVID questionnaire *each* day on campus** (http://mhcc.edu/covid) *(on phone ok)*
- **wearing a mask** *recommended* while on campus

I'll be doing this as well.... alas.

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A Typical Week in CH 221

Monday:
- Start reviewing lecture material for upcoming problem set / exam, read chapter, or watch Complete Lecture, Screencasts, lecture videos, etc.

Wednesday (Sec. H1) *or* **Friday (Sec. 01):**
- Turn in last week's lab during recitation in AC 2501
- Self correct Problem Set in recitation, then turn in
- Take Quiz (over Problem Set material)
- Complete lab in AC 2507 (bring printed copy of lab)

See "What's Due This Week" Schedule in syllabus

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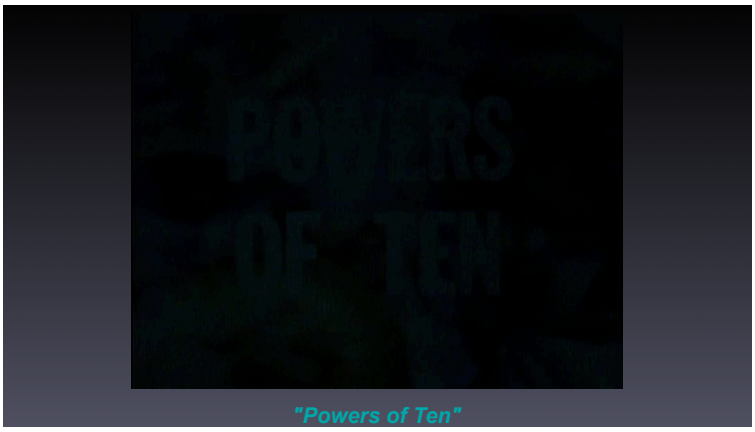
Why Take Chemistry?

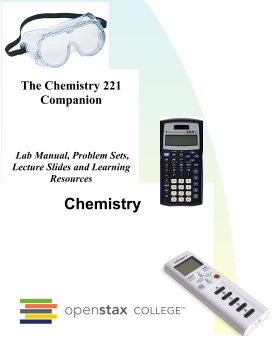
Versatile field: *medicine, NASA, engineering, etc.*

Financially lucrative: *"show me the money!"*

Understand your world: *"Appearances can be deceiving"*



What Do I Need For CH 221?



- A **Textbook** *(OpenStax,* **free download!***)*
- The **Chemistry 221 Companion**
- **Scientific Calculator** *(Exp or EE, log, ln), I do not recommend cell phones as calculators*
- **Safety Glasses** *for select labs*
- iClicker 2 *(optional, if you attend lecture)*
- *The ability to* print assignments */ access to the* **Internet**

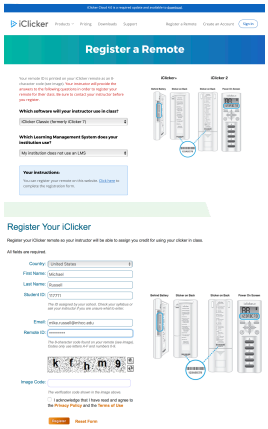
What's This Class Like?

Lectures - *MWF 9-9:50 AM AC 1303*

Six chapters (Eight sections) covered

Lectures are recorded, *you can watch them later*

How do I learn the material?
Use **Chapter Guides**, **podcasts**, **Handouts**, **Videos**, **Complete Lectures**, etc. *to learn material.. pick what works for you!*



Registering an iClicker

- *Go to* **iClicker.com/register-a-remote**
- *Select* **iClicker Classic (formerly iClicker 7)** *and* **My institution does not use an LMS**
- *Press* **Click here** *then follow the instructions using your MHCC ID for the "Student ID" field*
- Ask me if questions arise! *See:* http://**mhchem.org/ic**

What's This Class Like?

Recitation - ***Assignments***

First 90 to 120 minutes of "lab" in **AC 2501**, turn in *labs* and *problem set*, then take *quiz*
Labs - turn in lab handout(s) from previous week's lab. Labs always due at Recitation! **Printed versions only**, no emailed labs.
Problem Sets - found on website (*not textbook*), use "check" system for grading (next slide). Turn problem sets in during recitation (printed copy).

The Problem Sets

Problem sets *found on* **website** *(mhchem.org/221) and* turned in during recitation. *Complete problem set* ***before*** *coming to class!*

- *First:* **put a problem on the chalk board**
- *Next:* **self-correct *each* problem set problem** *(both right and wrong), then turn it in*
- *Check plus = 5 points, check = 3 points, check minus = 1 point (includes late problem sets)*

Common self-correct symbols for correct problems

The Labs (AC 2507)

Labs on **CH 221 website,** some labs will require **safety glasses (get them!),** use "in class" versions (not "online")

Lab reports ***due the following week*** in recitation (Wednesday (H1) *or* Friday (01)

Late labs: one point off by end of next day, one point each day thereafter. *Late labs emailed will suffer a 2 point grading fee.*

Turn in all 9 labs, receive **Lab Completion Bonus (20 pts)** *at end of term*

Quizzes & Exams

Quizzes and Exams will be "show your work" assessments and taken in AC 2507. Calculators and periodic tables allowed.

Show your work on quizzes and exams! **Lowest quiz dropped** at end of term.

Sample Quizzes and Exams can be found on the CH 221 website (*"Class Resources - Quizzes and Exams"*)

See "What's Due This Week" Schedule in syllabus

Class Presentations

Topic: **Elements**

Everyone: 5 minute presentation and paper on a unique **element**

Step 1: **Reserve** a unique element *(Week 4)*

Step 2: Class Presentations **Rough Draft Paper** *(Week 7)*

Step 3: **Give** Class Presentation *to this lab section*, **submit** final Class Presentation Paper *(week 9)*

More info: **Class Presentations FAQ** *(syllabus and online)*

The Web Site: http://mhchem.org/221

Access in libraries, coffee shops, at MHCC, on phones, wherever!

Resources: Answers to **quizzes**, **Web Lectures**, **Complete Lecture** videos, Chemistry **Links**, **Handouts**, **Labs**, **Announcements**, ***extra credit***, **syllabus**, **Web Quests**, much more - ***Explore!***

Grades posted after second week (use ID number)

I Need Help!

Tutoring center (LSC/AVID) *both* **in person** *and* **online** in chemistry, see schedule: http://mhcc.edu/lsc/

Tutoring is free!

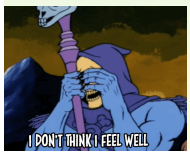
Office Hours (**MWF** 10-11 AM and **WF** noon - 1 PM)

Discord *(https://discord.gg/XrumtbY)*

Email mike.russell@mhcc.edu

Talk to me if feeling stressed!

I Feel Sick!



If you feel unwell, here's what you should do:

- *First:* **email me and let me know**
- *Next:* **I will shift you to the "online" version (section W1) of CH 221 while you get better.** You might need to submit assignments via email instead of in person, but otherwise all is well. Due dates will not change.
- *Stay safe, stay healthy!!!*

This Week's Lab: the "Eight Bottles" lab

- Fun lab, great "intro to the lab area"
- We will meet in **AC 2507**. Work in groups of 2 or 3 people.
- Each student will turn in **completed** lab report in class next week Wednesday
- Safety glasses required at least once this quarter

Next Week's Assignments

- *Turn in* "**Eight Bottles**" *Lab on* F (01) *or* W (H1)
- *Turn in* **Problem Set #1** *on* F (01) *or* W (H1) *after self corrections (Practice Problem Set #1)*
- *Take* **Quiz #1** *after Problem Set #1 (Sample quizzes! Bring calculator!)*
- *Bring printed* "**Density (in class)**" *Lab - different from Density (online) version!*
- "**What's Due This Week**" *in Syllabus*

How to Do Well in Chemistry

Commit the Time - *two hours of study per lecture hour, one hour per lab hour*

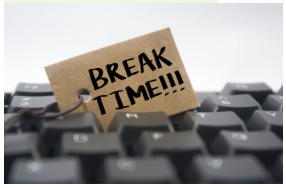
Take notes - *how and what is up to you, but writing increases memory retention*

Use the Textbook, website, etc. - *review before class, practice many problems, study summaries*

You CAN pass this class, and I will help you in any way possible!

...and always... if questions, **ASK ME!**

Time for a Quick Break!



Quick Math & Calculator Hints for CH 221!

Scientific Notation

Scientific notation used by scientists to express very large and very small numbers in a compact fashion.

To express a number in scientific notation we rewrite the quantity as a number (between 1 and 9) multiplied by 10 raised to a power (exponent) that tells us how we moved the decimal point.

- Multiply the number by 10^0. (*Remember* $10^0 = 1$)
- Move the decimal point to give a number between 1 and 10.
- Every time we shift the decimal point to the left by one place we increase the value of the exponent by one.
- Every time we shift the decimal point to the right by one place we reduce the value of the exponent by one.

$$215. = 2.15 \times 10^2$$

Decimal point is moved two places to the left, so exponent is 2.

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Scientific Notation

Example: Write 120,000 in scientific notation.

$120{,}000 = 120{,}000 \times 10^0 = 1.2 \times 10^5$

Example: Write 0.0000012 in scientific notation.

$0.0000012 = 0.0000012 \times 10^0 = 1.2 \times 10^{-6}$

negative exponent is not a negative number!

(i.e. -1.2×10^{-6})

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Calculators and Scientific Notation

Converting to scientific notation from regular numbers (and vice-versa) can be very helpful!

Most TI calculators: "Mode", then "Exponential Format" to select (or de-select) scientific notation

Do *NOT* use "Engineering Mode" - it will write 3.14×10^5 as 31.4×10^4... this is not acceptable in chemistry.

I will go around the room and answer any questions!

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Calculators and Powers of Ten

The magic of the "EE" Button!

Most calculators have an "EE" button (or "Exp", etc.) which means "times 10 to the".

Example: on a TI89, **3.14E5** means "**3.14×10^5**"

You could enter: 3.14 * "10^x" 5 *or* 3.14 EE 5

The second is better for two reasons:

- fewer buttons to push
- EE automatically places "x 10^5" with the previous number.... this can be important! *(next slide)*

The EE Button on the Nspire

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Calculators and Powers of Ten

The magic of the "EE" Button - continued

Calculate the following:

$$\frac{2.3123 \times 10^{19}}{1.217 \times 10^{16}}$$

Correct answer: **1900**

If you got: **1.9×10^{35}**, **the calculator thinks you are multiplying by 10^{16}** and not dividing. Use the EE button to avoid this pitfall!

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Factor-Label Method of Unit Conversions

Quantities measured in the lab usually have **units (labels)** which tell us the type of measurement made.

For example:

5.2 cm - the unit (cm) tells us the type of measurement made is length.
16.237 g - the unit (g) tells us the type of measurement made is mass.

Often we must convert one kind of unit for a measurement to a different kind. For example, we may need to convert 28 inches into a certain number of feet. The **factor-label** method (also known as the *dimensional analysis* method) uses **conversion factors** and units (**labels**) to solve problems of this type.

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Factor-Label Method of Unit Conversions

Conversion factors are fractions that relate two kinds of units. One way in which they may be obtained is from equalities.

For example: 12 in = 1 ft is an equality which leads to two equivalent fractions (conversion factors) generated by dividing one side of the equality by the other side.

$$\frac{12\text{ in}}{1\text{ ft}} \qquad \frac{1\text{ ft}}{12\text{ in}}$$

Another common conversion factor: there are 4 quarters in a dollar ($):

$$\frac{4\text{ quarters}}{1\text{ \$}} \qquad \frac{1\text{ \$}}{4\text{ quarters}}$$

And:

These two quantities are the same.

$$\frac{1\text{ km}}{0.6214\text{ mi}} \text{ or } \frac{0.6214\text{ mi}}{1\text{ km}}$$

These two quantities are the same.

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Factor-Label Method of Unit Conversions

And yet another common example:

60 min = 1 hr is an equality which leads to two equivalent conversion factors.

$$\frac{60\ \text{min}}{1\ \text{hr}} \qquad \frac{1\ \text{hr}}{60\ \text{min}}$$

Other forms : $\frac{60\ \text{min}}{\text{per hr}} = 60\ \text{min/hr} = \frac{60\ \text{min}}{1\ \text{hr}}$

When you are new to the factor-label method, it is most helpful to use the form that has a numerator and denominator term (and not 60 min/hr)

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Test yourself: How many hours in 3.5 weeks?

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When solving a problem, set up an equation so that *all unwanted units cancel*, leaving only the desired unit. *For example*, we want to find out how many kilometers are there in 26.22 miles. We will get the correct answer if we multiply 26.22 mi by the conversion factor km/mi.

$$26.22\ \text{mi} \times \frac{1\ \text{km}}{0.6214\ \text{mi}} = 42.20\ \text{km}$$

42.195043....

Starting quantity | Conversion factor | Equivalent quantity

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Test yourself: How many quarters will a tourist need to travel 555 km? Car: 22 miles per gallon, gas: $1.37/gallon, 1.61 km = 1 mile

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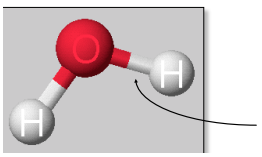
Metric System

The Metric System uses a series of conversion factors based on powers of ten.

1 kilometer (km)	=	10^3 meters (m)
1 centimeter (cm)	=	10^{-2} meters (m)
1 millimeter (mm)	=	10^{-3} meters (m)
1 micrometers (μm)	=	10^{-6} meters (m)
1 nanometer (nm)	=	10^{-9} meters (m)

Know these five metric conversions!



O-H distance =
9.4×10^{-11} m
9.4×10^{-9} cm
9.4×10^{-5} μm
0.094 nm

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Test yourself: How many km in 1.9×10^{13} μm?

1 kilometer (km) = 10^3 meters (m)
1 centimeter (cm) = 10^{-2} meters (m)
1 millimeter (mm) = 10^{-3} meters (m)
1 micrometers (μm) = 10^{-6} meters (m)
1 nanometer (nm) = 10^{-9} meters (m)
Know these five metric conversions!

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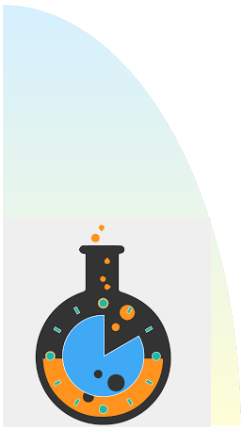

Time to go to lab!

AC 2507 is nearby