

# CHM 112: General Chemistry II

Dr. Maria Donnelly  
madon@uri.edu

Chemistry: Atoms First, 4<sup>th</sup> ed  
J. Burdge & J. Overby, McGraw Hill

Ch. 13: Physical Properties of Solutions

Ch. 14: Chemical Kinetics

Ch. 15: Entropy & Gibbs Energy

Ch. 16: Chemical Equilibrium

Ch. 17: Acids, Bases, & Salts

Ch. 18: Acid Base Equilibria & Solubility Equilibria

Ch. 19: Electrochemistry

Concepts build on each other &  
on knowledge from CHM 101

**In-person Chemistry Labs Start  
Tuesday Feb. 9<sup>th</sup>**

**Required introductory Lab Zoom  
meetings week of Feb. 1<sup>st</sup>**

**Safety Training is required for all Chemistry  
Labs**

**You must complete the required on-line lab safety  
module before attending your first in-person lab.**

**See your CHM 114 Brightspace site for an  
introductory video with details about safety training  
and lab and department policies**

**This introductory video must be viewed before the  
start of in-person labs. DO NOT WAIT UNTIL  
MONDAY Feb. 8<sup>th</sup>!!!**

# Course Organization & Expectations

## Required Materials

- Book: Chemistry: Atoms First 4<sup>th</sup> edition
  - By Julia Burdge & Jason Overby
  - Published by McGraw Hill
  - Can use either paper or electronic
- Access to Connect online homework
  - Smart Book assignments
  - Homework assignments
- Scientific calculator
- Brightspace/URI email
  - Exams
  - Gradebook
  - Announcements
  - Submission of group work
  - Links to videos & other course resources
- Many course resources can also be accessed through <https://www.chm.uri.edu/index.php/misc-user-page/?buttonname=miscbutton&person=mdonnelly&topicname=CHM112>



Chapters 1–12

# Useful Information: Course & Introductory Information, Lecture Notes, Links to Lecture Videos etc.

<https://www.chm.uri.edu/index.php/misc-user-page/?buttonname=miscbutton&person=mdonnelly&topicname=CHM112>

THE UNIVERSITY OF RHODE ISLAND

DEPARTMENT OF CHEMISTRY

1-401-874-2318 chemistry@etal.uri.edu

Home People ▾ Research For Prospective Students For Current Students Links ▾ Contact Us

## Dr. Donnelly's CHM 112 Student Resources

### Course Information

Syllabus

Beaupre 100 Seating Chart

### Connect Information

General Connect Information

Registration Information

### Lecture Slides

Introductory Material

Chapter 13

Chapter 14

Chapter 15



# Brightspace

To get to  
announcements

THE  
UNIVERSITY  
OF RHODE ISLAND

CHM112: General Chemistry Lecture II\_000...



Maria Donnelly  
as Learner



Course Home Content Assignments Discussions Quizzes Classlist Grades Class Progress Course Tools ▾ Help ▾ More ▾

Search Topics



[Overview](#)

Bookmarks

Course Schedule

Table of Contents

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Course Introduction -  
Start Here!



Link to course content  
videos and slides



## Overview

Print

**CHM 112** continues laying the foundation for future chemistry, biochemistry, pharmaceutical, and engineering courses that was started in CHM101. The terminology, fundamental principles, and theories presented in CHM112 will be heavily used in these future courses. An understanding of the material presented and the ability to apply the concepts being studied to real-world problems is essential for many different fields of study.

**Instructor:** Dr. Maria Donnelly

**Email:** [madon@uri.edu](mailto:madon@uri.edu)

**Office:** Beupre 117C (entrance to the office suite is through room 115)

**Office Hours:** Specific office hours for each week can be found on Starfish, and appointments can also be made through Starfish. (You can access Starfish through URI's single sign on. There is a link to the related IT page below.) If you would like to request an appointment at a time not listed on Starfish, please send me an email to see if I can be available. By default office hours will be held via zoom (link is below), but you can request Webex if you prefer. Appointments are required for

Announcements also – must opt in!

# Communication

- Check your URI email account frequently!
- Brightspace will be used to
  1. Provide resources & links to useful information
  2. Communicate important information to students
    - You will need to opt in to receive email notifications from Brightspace
  3. Take exams & submit group work assignments
  4. Post grades

Click on the box by your name to get the drop down box

THE UNIVERSITY OF RHODE ISLAND | CHM102: Laboratory for Chemistry 101\_00... [grid icon] [envelope icon] [chat icon] [bell icon] [MD] Maria Donnelly [gear icon]

Course Home Content Assignments Discussions Quizzes Classlist Grades Class Progress C View as Collaborator Change

## Notifications

Control how you receive notifications about activity in your courses. You can receive a periodic summary of activity, or receive instant notifications.

- View as Collaborator
- Change
- Profile
- Notifications
- Account Settings
- Log Out

Select notifications

### Instant Notifications

Activity Feed - new comments from others on a post

Activity Feed - new posts created by others

Announcements - announcement updated

Announcements - new announcement available

At a minimum, get notifications for announcements. You can get additional notifications if you choose

# Course Organization & Expectations

## Course Organization

### Asynchronous Portion

- Lectures will consist of PowerPoint presentation videos with sample problems worked out as examples
  - Videos will be posted online with links available via Brightspace
  - Can be watched at a time convenient to you
  - Make sure to watch videos early enough to be able to complete your homework on time & be prepared for exams
  - Videos should be available at least until the end of the semester
  - Homework will be completed and submitted through McGraw Hill's Connect Program.
    - Has specific due dates (Mondays & Fridays)
    - Can submit early!

# Course Organization & Expectations

## Required Synchronous Portion

- Students will meet once a week on Thursdays at the normal class time to work through problems in groups.
  - Meetings will be held via zoom.
  - You will be assigned a "CHM 112 Support Group", and will work through problems as a group in breakout rooms
    - Groups will be changed about half way through the semester to allow you to meet other students. Groups that really want to stay together will be given the option to remain as a group.
  - I will be available to answer questions
  - The groups will submit their work via Brightspace by ~ 11:00am (each student must submit their work)
  - Grades will be based on attendance; 50 pts per meeting
    - One absence is permitted without penalty
    - I will drop into the breakout rooms to take attendance
  - Work will not be graded
  - Solutions will be posted at the end of the week

# Course Organization & Expectations

## Optional Synchronous Portion

- Tuesday meetings will be optional
  - Meetings will be held via zoom during the scheduled class time.
  - The exact format of the optional meetings will vary based on student needs throughout the semester.
  - The discussion portion of Brightspace will be used to allow students to request topics to be covered, ask questions in advance, request that I go over certain problem types, etc.
  - Students are also welcome to ask questions during the meetings (they do NOT need to be asked in advance).
    - The ability to ask in advance will help me to have example problems ready and will hopefully encourage more students to ask questions.
  - Anonymous posts will be allowed.

# Schedule

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
<b>January</b>						
24	25	26	27	28 Intro Mtg	29	30
<b>February</b>						
31	1 SB13	2 Optional Mtg	3	4 Group Work C13	5 HW13	6
7	8 SB14	9 Optional Mtg	10	11 Group Work C14	12 HW14a	13
14	15	16 Optional Mtg	17	18 Exam 1	19 HW14b	20
21	22 SB15	23 Optional Mtg	24	25 Group Work C15	26 HW15	27
<b>March</b>						
28	1 SB16	2 Optional Mtg	3	4 Group Work C16	5 HW16a	6
7	8	9 Optional Mtg	10	11 Exam 2	12 HW16b	13
14	15 SB17	16 Optional Mtg	17	18 Group Work C17	19 HW17a	20
21	22 SB18	23 Optional Mtg	24	25 Group Work C18	26 HW17b	27
28	29	30 Optional Mtg	31			
<b>April</b>						
				1 Exam 3	2 HW18a	3
4	5	6 Optional Mtg	7	8 Group Work C18	9 HW18b	10
11	12 SB19	13 Optional Mtg	14	15 Group Work C19	16 HW19a	17
18	19	20 Optional Mtg	21	22 Exam 4	23 HW19b	24
25	26	27	28	29	30	

**Graded on 7 of 8 required class meetings.  
Tuesday sessions are optional.**

# Course Organization & Expectations

## Homework

- Homework will be completed and submitted through the McGraw Hill Connect online homework program
- There are two types of homework
  - Homework assignments (1 or 2 per chapter)
    - Ten points per question
    - Best to complete after watching lecture video
    - Can be submitted late automatically with 2% per day loss of credit
  - Smart Book assignments (1 per chapter)
    - 100 points each, graded based on completion
    - Assigned toward the beginning of the chapter as an introduction to the material
    - To submit late, email me to request an extension
- There will also be **OPTIONAL** practice assignments with additional questions.

# Connect Assignments

CHM 101 SEC 4 FALL 2020 - CHM 101 SEC 4 FALL 2020

**Required**

**NOT Required**

**Read**

**To read ebook**

Assignments			
Chapter 1 Smart Book	Start: Sep 9, 2020 at 12:00 AM EDT Due: Sep 14, 2020 at 11:59 PM EDT	CHM 101 Sec 4 Fall 2020   C...	SB
Chapter 1 Homework	Start: Sep 9, 2020 at 12:00 AM EDT Due: Sep 18, 2020 at 11:59 PM EDT	CHM 101 Sec 4 Fall 2020   C...	Homework
Chapter 1 Practice	Start: Sep 9, 2020 at 12:00 AM EDT Due: Dec 31, 2020 at 11:59 PM EST	CHM 101 Sec 4 Fall 2020   C...	Homework

Read

Burdge, Chemistry: Atoms First, 4e  
Julia Burdge, 4e

Questions are required. All questions must be answered to receive full credit.

Concepts

1.1 THE STUDY OF CHEMISTRY

Chemistry often is called the *central science* because knowledge of the principles of chemistry can facilitate understanding of other sciences, including physics, biology, geology, astronomy, oceanography, engineering, and medicine. **Chemistry is the study of matter and the changes that matter undergoes.** Matter is what makes up our bodies, our belongings, our physical environment, and in fact our entire universe. **Matter** is anything that has mass and occupies space.

**Chemistry You May Already Know**

You may already be familiar with some of the terms used in chemistry. Even if this is your first chemistry course, you may have heard of *molecules* and know them to be tiny pieces of a substance—much too tiny to see. Further, you may know that molecules are made up of *atoms*, even smaller pieces of matter. And even if you don't know what a *chemical formula* is, you probably know that H<sub>2</sub>O is water. You may have used, or at least heard, the term *chemical reaction*; and you are undoubtedly familiar with a variety of common processes that are chemical reactions, such as those shown in **Figure 1.1**. Don't worry if you are not familiar with these terms; they are defined in the early chapters of this book.

To Questions



# Schedule

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18	19	20 Optional Mtg	21	22 Exam 4	23 HW19b	24
25	26	27	28	29	30	

Smart Book  
due dates  
(in purple)

Homework  
due dates  
(also purple)

# Connect Registration

Registration Information  
is section specific!

Your Section!

Section 1:  
Spring 2018  
TTh 9:30 am

Section 2:  
Spring 2018  
TTh 11:00 am

Section 3:  
TTh 9:30 am

**connect**

student registration information  
course

Spring 2018 CHM 101 General Chemistry  
with LearnSmart and LearnSmart Prep

instructor

Maria Donnelly

section

Spring 2018 Section 1 TTh 9:30 am

**online registration instructions**  
Go to the following web address and click the "register now" button.

<https://connect.mheducation.com/class/m-donnelly-spring-2018-section-1-tth-930-am>

This is a unique address for  
**Spring 2018 Section 1 TTh 9:30 am**

Having trouble registering?  
Get help here: <http://bit.ly/StudentRegistration>

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**connect**

student registration information  
course

Spring 2018 CHM 101 General Chemistry  
with LearnSmart and LearnSmart Prep

instructor

Maria Donnelly

section

Spring 2018 Section 2 TTh 11:00 am

registration dates

01/18/18 - 05/01/18

**online registration instructions**  
Go to the following web address and click the "register now" button.

<http://connect.mheducation.com/class/m-donnelly-spring-2018-section-2-tth-1100-am>

This is a unique address for  
**Spring 2018 Section 2 TTh 11:00 am**

Having trouble registering?  
Get help here: <http://bit.ly/StudentRegistration>

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**connect**

student registration information  
course

Spring 2021 CHM 112 TuTh 9:30

instructor

Maria Donnelly

section

Spring 2021 CHM 112 TuTh 9:30

**online registration instructions**  
Go to the following web address and click the "register now" button.

<https://connect.mheducation.com/class/m-donnelly-spring-2021-chm-112-tuth-930>

This is a unique address for  
**Spring 2021 CHM 112 TuTh 9:30**

Having trouble registering?  
Get help here: <https://bit.ly/StudentRegistration>

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Link to registration page

# Connect Registration

Welcome

CHM 101 SEC 4 FALL 2020  
CHM 101 SEC 4 FALL 2020

**INSTRUCTOR**  
MARIA DONNELLY

**CHEMISTRY: ATOMS FIRST**  
JULIA BURDGE, 4TH ED.

Enter your email to join this class:

Email

By using this site you agree to the [Terms of Use and Privacy Notice](#).

BEGIN >

Need help? [Contact customer service](#) →

Create your McGraw-Hill account.

Email Address  
mdonenly@uri.edu

Confirm Email Address  
Confirm Email Address

Password

Confirm Password

First Name  
First Name

Last Name  
Last Name

Security Question  
Select a Question

Security Answer  
Security Answer

We'll ask you this question to retrieve your password.

Mobile Number  
(optional, get important text alerts)

Mobile Number

I agree to the terms of the McGraw-Hill [Terms of Use and Privacy Notice](#).

CONTINUE



Instructor:  
Maria Donnelly



Burdge: Chemistry: Atoms First  
4TH EDITION  
Julia Burdge

A two week courtesy access is available if you cannot immediately purchase an access code.

If you purchased a two year access code last semester, you will not need a new one.

If you purchased the 6 month access code last semester, you will need to purchase a new code.

If you purchased a two year access code for Chang in a previous semester, email me.

## Student Registration



**General Chemistry: The Essential Concepts**  
ISBN:007623290  
Edition:7  
Author:Raymond Chang, Kenneth Goldsby

### Already purchased?

To access your course materials, first enter your 20 digit registration code.

Registration Code:

Example: GRFU-BYHA-6MYJ-FGKX-F9XA

Submit

[How do I register?](#) | [What is a registration code?](#)

### What you get with Connect:

- Digital Access to the textbook
- Interactive tools that help you focus your study time
- Exclusive discounts on a print copy of the textbook

### Need to purchase?

No registration code, no problem. You can buy access to General Chemistry: The Essential Concepts right now. All you need is a credit card.



Buy Online

### Need Temporary Access?

You can get two week access to your course materials. After that your work will be graded and you can purchase access.

Start courtesy access

(Older screenshot, looks a little different now)

# Course Organization & Expectations

## Exams

- Exams will be held at the scheduled class time.
  - Dates are in the syllabus and the schedules in this presentation
- Exams will be completed and submitted through Brightspace
  - Questions will be in the quizzes section
  - Multiple choice questions will be answered in the quizzes section
  - Work & answers for short answer questions must be uploaded in the assignments section for grading.
    - The uploaded work is what I will grade for your exam
    - Single pdf files are the best for grading & viewing feedback
    - There is info in Brightspace about ways to turn your work into a single pdf file
    - If you have trouble submitting work for your short answer questions, email me your work BEFORE THE SUBMISSION DEADLINE
    - Points will be deducted from exams that are submitted late.

# Course Organization & Expectations

## Exams con't

- Exams will be open book & notes.
- **Use of google or help from another individual is not permitted and is considered academic dishonesty – see policies in the syllabus & University manual.**
- If you feel there is an error in the grading of your exam, you must bring this to my attention within 48 hrs of the graded exam being returned to you. No grade changes will be considered after this time.

# Schedule

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18	19	20 Optional Mtg	21	22 Exam 4	23 HW19b	24
25	26	27	28	29	30	

**Semester exams are listed in red.**

**Final exam is currently May 4<sup>th</sup> from 8:00–11:00am**

# Course Organization & Expectations

## Grading

Online Homework, Smart Book, & Participation	20 %
3 of 4 Lecture Exams* (20 % each)	60 %
Final Exam	20 %
<b>Total</b>	<b>100%</b>

- Your final course average will be calculated using the following formula:

$$\text{Course Avg.} = (\text{Homework Avg.} \times 0.20) + (\text{Exam Avg.} \times 0.80)$$

- The homework average includes homework assignments, smart book assignments, & group work participation
  - Each homework assignment counts for a given number of points based on the number of questions
  - Each Smart Book assignment counts for 100 points
  - Each group work counts for 50 points
  - $\text{HWK Avg.} = (\text{pts. earned} / \text{total \# of pts possible}) \times 100$
- To eliminate the need for make-up exams, you will be graded on 4 out of 5 exams.

# Incomplete Policy

Incomplete grades cannot be assigned except in the case of a real emergency. Any grade of incomplete must be approved by the department chair and the dean. In order to receive an incomplete, a student's **course work must have been passing** and the student **must have completed at least half of the coursework for the semester**. Incompletes should be made up within one year of the semester in which the grade of incomplete was assigned. **If an incomplete is not made up prior to the two year grade change deadline established by the University, the "I" will be replaced with a grade calculated for the student based on the work completed and including zeroes for any work not completed.**



# Getting Help

**Make sure to seek help right away if you feel you are struggling with material**

- Office hours will be held via zoom (webex also available by request).
  - Use Starfish to sign up for a time
  - Zoom address will be provided in Starfish
  - If you prefer webex let me know
  - Email me to ask for a meeting outside of office hours
- Chemistry department TAs also hold office hours
  - There will be a single Webex address for TA help in gen chem
  - Can ask any 114 TA for help
  - Also a CHM 112 TA – Athina
    - Will hold office hours & Extra help sessions
  - Link to the TA office hour schedule will be posted in Brightspace as soon as it is available.
- AEC also offers tutoring ([www.uri.edu/aec](http://www.uri.edu/aec))

**I am happy to help!!!**



# Your choices will determine your level of success

- **Watching the videos is VERY important**
  - They are the lectures I would give in an in-person class!!!
  - prepare in advance – become familiar with key terms & ideas
  - pay attention, write down questions to ask
  - print out slides and use them to take notes on
  - **if you get tired, take a break & finish the video later!**
- **Assignments are designed to help you learn**
  - focus on WHY you need to follow certain steps to solve problems rather than trying to memorize the steps
  - ask yourself what you do and do not understand
- **Complete assignments on time**
  - mastery of early material will help with material covered later
  - avoid having assignments build up & losing points due to lateness
- **Seek help right away!**
  - office hours
  - Athina & CHM 114 TAs
  - AEC

**CHM 101 Knowledge is  
Essential!!!**

**See me, Athina, or a CHM  
102 or 114 TA RIGHT  
AWAY if you need help  
remembering CHM 101**

# Science Basics

## Measurements:

- SI units & prefixes
- Scientific notation - know how to work with your calculator
- Rounding & significant figures

## Dimensional Analysis

- Use of dimensional analysis to solve problems
- Conversions between mass, volume, moles, etc.

## Percents, fractions, ratios (mass, elemental, moles, etc.)

- Know the difference between them & how to find them for chemical systems.

# Chemical Formulas & Names

## Formulas:

- First element symbol is the most positive (metal if ionic)
- If both in same column, first element is lowest
- Covalent – subscripts based on # atoms in molecule
- Ionic – subscripts based on balancing charges

## Names

- Salts & binary molecules – 2 words, one for each element, with first element in formula written first
- 2<sup>nd</sup> word has -ide ending (if not a polyatomic ion)
- Covalent – prefixes indicate # atoms of each element
- Ionic – Roman Numerals indicate charge of cation if more than one charge is possible

## Covalent:

NO = nitrogen monoxide

N<sub>2</sub>O<sub>4</sub> = dinitrogen tetroxide

## Ionic:

Ca<sub>3</sub>(PO<sub>4</sub>)<sub>2</sub> = calcium phosphate

Fe<sub>2</sub>Cl<sub>3</sub> = Iron (III) chloride

# Polyatomic Ions

Group of bonded atoms that share a charge

Know the names & formulas of the following:

Ammonium ( $\text{NH}_4^+$ )

Hydronium ( $\text{H}_3\text{O}^+$ )

Acetate ( $\text{CH}_3\text{COO}^-$ )

Carbonate ( $\text{CO}_3^{2-}$ )

Chlorate ( $\text{ClO}_3^-$ )

Perchlorate ( $\text{ClO}_4^-$ )

Sulfate ( $\text{SO}_4^{2-}$ )

Nitrate ( $\text{NO}_3^-$ )

Nitrite ( $\text{NO}_2^-$ )

Phosphate ( $\text{PO}_4^{3-}$ )

Cyanide ( $\text{CN}^-$ )

Permanganate ( $\text{MnO}_4^-$ )

Hydroxide ( $\text{OH}^-$ )

# Stoichiometry

## Mass & Moles

- Finding molar mass
- Conversion between mass & moles
- Using Avogadro's # to convert between particles & moles

## Chemical Equations

- Writing & balancing chemical equations
- Phase meanings (s, l, g, aq)
- Determining amount of products (or reactants, etc.), including limiting reagents

## Percent Composition of Materials

- Calculate mass percent
- Calculate mass of a material from mass percent

# Solution Chemistry

## Molarity

- Calculating molarity
- Conversions between mass, moles & liters

## Solutions & Dilutions

- Using  $M_1V_1 = M_2V_2$
- Calculate mass of solid needed to make a solution

## Acid-Base Titrations

- Identifying acids & bases
- Ionization properties of acids & bases
- Determining concentration of unknown solutions using titration



## Know these Acids:

Hydrochloric Acid:	HCl
Sulfuric Acid:	H <sub>2</sub> SO <sub>4</sub>
Nitric Acid:	HNO <sub>3</sub>
Perchloric Acid:	HClO <sub>4</sub>
Carbonic Acid:	H <sub>2</sub> CO <sub>3</sub>
Phosphoric Acid:	H <sub>3</sub> PO <sub>4</sub>

**You will encounter them frequently**

# Redox Reactions

## Oxidation Numbers

- Determining the oxidation number of each atom in a chemical formula

## Write & Balance Redox equations

- Knowing what was oxidized & reduced
- Determining the number of electrons transferred

## Redox Titrations

- Determining concentration of unknown solutions using titration
- Essentially solution stoichiometry problems

# Gases & Thermodynamics

## Ideal Gas Equation

- Know how to use it
- Using the correct units based on R
- Be able to solve for a variable in  $PV=nRT$  to be used in other problems (like you did in gas stoichiometry)

## Enthalpy ( $\Delta H$ )

- Understanding enthalpy of reactions
- Endothermic vs. Exothermic
- Using enthalpy tables to calculate enthalpy of reactions
- Hess' Law

# Elements & Compounds

## The Electronic Structure of Atoms

- Understanding atomic structure & how it influences reactivity

## The Periodic Table

- Using the Periodic Table to get information about elements

## Chemical bonding

- Understanding how atoms interact with each other to form bonds
- Understanding Lewis Structures & molecular structure

# Math

## Solving Problems with the line equation: $y=mx+b$

- Know how to solve for slope, etc.
- Be able to solve the equation when logarithms are present:  $\ln(y) = mx + \ln(b)$
- Be able to solve with inverses:  $1/y = mx = 1/b$

## Logarithms (log) & natural logarithms (ln)

- Be able to use these functions on your calculator
- See appendix 3 in your book for more info on logs

## Algebra & solving equations

## Scientific notation & working with exponents

## Square, cubed, & other root functions