

## CHEM 101201, General Chemistry II Summer 2019, 3.0 Credits

**Instructor:** G. William Griffin, Ph. D., Visiting Associate Professor  
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**Office:** Merkert XXX  
**Office Hours:** Monday and Wednesday 2:45-4:00; Tuesday 11:30-12:45  
**Telephone:** (617) 228-2133; (617) 552-2605 (BC extension 2-3620)  
**Schedule (class times and day(s)):** Monday-Wednesday and Friday, 8:30-11:15 AM,  
July 9, 2019 to August 2, 2019

**Room:** Merkert 130  
**BC website (Canvas):** <http://cms.bc.edu> or via Agora

### Boston College Mission Statement

Strengthened by more than a century and a half of dedication to academic excellence, Boston College commits itself to the highest standards of teaching and research in undergraduate, graduate and professional programs and to the pursuit of a just society through its own accomplishments, the work of its faculty and staff, and the achievements of its graduates. It seeks both to advance its place among the nation's finest universities and to bring to the company of its distinguished peers and to contemporary society the richness of the Catholic intellectual ideal of a mutually illuminating relationship between religious faith and free intellectual inquiry.

Boston College draws inspiration for its academic societal mission from its distinctive religious tradition. As a Catholic and Jesuit university, it is rooted in a world view that encounters God in all creation and through all human activity, especially in the search for truth in every discipline, in the desire to learn, and in the call to live justly together. In this spirit, the University regards the contribution of different religious traditions and value systems as essential to the fullness of its intellectual life and to the continuous development of its distinctive intellectual heritage.

### Course Description

This course is a continuation of General Chemistry I (CHM-109). Topics include chemical kinetics, solutions, chemical equilibria, oxidation-reduction, and electrochemistry.

*Prerequisite:* Successful completion of General Chemistry I (CHM-109)

### Course Objectives

1. The student will be able to describe and represent 3-D crystal structures of simple solids.
2. The student calculate physical properties related to phase changes and solvents including enthalpy changes and vapor pressures.
3. The student will demonstrate the ability to relate phases of matter to intermolecular forces with an emphasis on predicting and describing hydrogen bonding in liquids.
4. The student will calculate physical properties of solutions and demonstrate how they differ from pure solvents. This will include colligative properties and solution concentrations.
5. The student will convert solution concentrations from one set of units to another including molarity, molality, mole fraction and percentage.
6. The student will generate general and specific forms of the rate equation for various chemical reactions. This will include determining the order of reaction using the initial rates method.
7. The student will be able to express rates using transition state theory and be able to calculate activation energies from experimental data.
8. The student will be able to write equilibrium expressions from a chemical equation and be able to solve algebraically solution concentrations from the equilibrium expressions.
9. The student will be able to describe and interpret qualitatively Le Chatelier's Principle and how it relates to an established equilibrium.
10. The student will be able to describe acids and bases using the Arrhenius, Bronsted-Lowry and Lewis acid-base theory.
11. The student will calculate hydrogen and hydroxide ion concentrations for neutral, acidic and basic solutions.

12. The student will generate equilibrium expressions and solve for solution concentrations for weak acids and bases as well as for the conjugate salts of these compounds.
13. The student will calculate pH values for acidic, basic, neutral solutions including buffer solutions using the equilibrium expressions and the Henderson-Hasselbalch equation.
14. The student will demonstrate and understanding of complex ion formation and its use in qualitative inorganic analysis.
15. The student will calculate thermodynamic quantities such as enthalpy, entropy and Gibb's Free Energy and relate these quantities to equilibrium constants.
16. The student will calculate standard cell voltages from reference values and predict the spontaneity of electrochemical reactions.
17. The student will balance oxidation-reduction reactions using the half-reaction method.

## Grading

Quizzes (two scores dropped)	10%	
Homework (one score dropped)	10%	
Hour Exam I (7/21/17)	28%	(Chapters 11-15)
Hour Exam II (7/31/17)	20%	(Chapters 15, 16 and 22.3)
Final Exam (8/4/17)	32%	(Chapters 11-18 and 22.3)

*No "extra work" (research papers, laboratory investigations, independent study, etc.) will be accepted to replace coursework in the categories listed above. Only electronic calculators are allowed for examinations and quizzes. Cell phones, PDAs, computers, portable media players, tablets, translators and any other devices capable of texting or internet connection and/or playing audio or video electronic files are not allowed for support on exams and quizzes.*

### Summer Grading System

The undergraduate grading system consists of twelve categories: A (4.00), A- (3.67), excellent; B+ (3.33), B (3.00), B- (2.67), good; C+ (2.33), C (2.00), C- (1.67), satisfactory; D+ (1.33), D (1.00), D- (.67), passing but unsatisfactory; F (.00), failure; I (.00), incomplete; F (.00), course dropped without notifying office; W (.00), official withdrawal from course. The graduate grading system is A (4.00), A- (3.67), Excellent; B+ (3.33), B (3.00), good; B- (2.67), C (2.00), passing but not for degree credit; F (.00), failure.

Grade Reports. All students are required to log into the web through Agora to access their summer grades. Students must utilize their BC username and password to log on. If your username or password is not known, the HELP Desk located in the Campus Technology Resource Center (CTRC) in O'Neill Library will issue a new one. The CTRC requires a valid picture ID (a BC ID, driver's license or passport) to obtain your password.

### Text(s)/Readings (Required)

*Chemistry, 13<sup>th</sup> Edition*, Raymond Chang and Kenneth Goldsby, McGraw Hill, (2019) ISBN: 978-1259911156

### Text(s)/Readings (Recommended)

*Student Solutions Manual* (for Chang text), McGraw Hill, (2019)  
ISBN13: 9781260162325

### Important Policies

<http://www.bc.edu/content/bc/schools/advstudies/guide/academicinteg.html>

### Written Work

Graduate and undergraduate students are expected to prepare professional, polished written work. Written materials must be typed in the format required by your instructor. Strive for a thorough, yet concise style. Cite literature appropriately, using APA, MLA, CLA format per instructors decision. Develop your thoughts fully, clearly, logically and specifically. Proofread all materials to ensure the use of proper grammar, punctuation, and spelling. You are encouraged to make use of campus resources for refining writing skills as needed [<http://www.bc.edu/libraries/help/tutoring.html>].

### Scholarship and Academic Integrity

It is expected that students will produce original work and cite references appropriately. Failure to reference properly is plagiarism. Scholastic dishonesty includes, but is not necessarily limited to, plagiarism, fabrication, facilitating academic dishonesty, cheating on examinations or assignments, and submitting the same paper or substantially similar papers to meet the requirements of more than one course without seeking permission of all instructors concerned. Scholastic misconduct may also involve, but is not necessarily limited to, acts that violate the rights of other students, such as depriving another student of course materials or interfering with another student's work.

### Request for Accommodations

If you have a disability and will be requesting accommodations for this course, please register the Connors Family Learning Center (learning disabilities or AHD) or the Assistant Dean for students with disabilities, (all other disabilities). Advance notice and appropriate documentation are required for accommodations.

<http://www.bc.edu/content/bc/libraries/help/tutoring/specialservices.html>.

### Use of Electronic Devices

The use of cell phones, computers, tablets and other electronic devices are allowed during lectures sessions but should not be a distraction for other students or the instructor. Cell phones are expected to have ringers set to a low volume or on vibrate and conversations should be conducted outside the classroom when the class is in session. During exams and quizzes only the reference materials provided by the instructor and a calculator can be used. The use of any other electronic devices including but not limited to cell phones, tablets and portable media players is expressly forbidden and may result in a decreased score or a grade of zero for the quiz or exam at the instructor's discretion.

### Attendance

Class attendance is an important component of learning. Students are expected to attend all classes and to arrive by the beginning of and remain for the entire class period. When an occasion occurs that prevents a student from attending class, it is the student's obligation to inform the instructor of the conflict before the class meets. The student is still expected to meet all assignment deadlines. If a student knows that he or she will be absent on a particular day, the student is responsible for seeing the instructor beforehand to obtain the assignments for that day. If a student misses a class, he or she is responsible for making up the work by obtaining a classmate's notes and handouts and turning in any assignments due. Furthermore, many instructors give points for participation in class. If you miss class, you cannot make up participation points associated with that class. Types of absences that are not typically excused include weddings, showers, vacations, birthday parties, graduations, etc. Additional assignments, penalties and correctives are at the discretion of the instructor. If circumstances necessitate excessive absence from class, the student should consider withdrawing from the class. In all cases, students are expected to accept the decision of the instructor regarding attendance policies specific to the class.

Consistent with our commitment of creating an academic community that is respectful of and welcoming to persons of differing backgrounds, we believe that every reasonable effort should be made to allow members of the university community to observe their religious holidays without jeopardizing the fulfillment of their academic obligations. It is the responsibility of students to review course syllabi as soon as they are distributed and to consult the faculty member promptly regarding any possible conflicts with observed religious holidays. If asked, the student should provide accurate information about the obligations entailed in the observance of that particular holiday. However, it is the responsibility of the student to complete any and all class requirements for days that are missed due to conflicts due to religious holidays.

There may be circumstances that necessitate a departure from this policy. Feel free to contact the Summer Session Office at 617-552-3800 for consultation.

**Deadlines:** Assignments are due at the beginning of the class period on the specified dates. Late assignments will be graded accordingly (less than full credit).

**Make-up Policy:** One hour examination can be made up if the student notifies the instructor by voice-mail or e-mail prior to the exam time and has a credible reason for absence from the exam (sickness, etc.). Make-up examinations do not contain extra credit and are assigned a point value of 100 points total. Examinations missed without notifying the instructor prior to the exam time will not be eligible for make-up and will be scored as a zero. Verifiable documentation must accompany requests for make-up of the final or more than one hour examination. All make-up examinations may be recorded at a discounted value (less than 100 points) at the instructor's discretion. There is no make-up for quizzes since two scores are dropped. Late homework assignments receive less than full credit as described below.

### **Course Assignments** (readings, exercises and/or experiences)

**Examinations:** There will be two hour examinations and a final examination which is cumulative but will emphasize information from the last part of the course not covered in the other hour examinations (scored as 100 points each but exams will normally have at least 5 points of extra credit).

**Quizzes:** Quizzes will be administered at the start of the class in all lecture sessions which do not immediately follow an examination and will reflect the topics covered the previous day. The two lowest quiz scores will be dropped (30 points each). No additional time will be provided students who come to class late for the quiz. As for exams students who require any special accommodations must provide written documentation prior to the first quiz taken.

**Homework:** Homework will be graded for effort and punctuality only. In both cases the assignments are normally due at the class break time (around 9:45 AM) although they may be collected at the end of the lecture period. Assignments received on time and showing reasonable effort will receive full credit. Late or incomplete assignments will receive less than full credit or a zero at the instructor's discretion. (1.0 point each)

**Time commitment:** Students will have to spend a significant amount of preparation time in addition to the contact time especially in this compressed format course. Students should be prepared to dedicate at least 3 hours per lecture day for reading and homework assignments.

**Computer support:** The BC Canvas site (<http://cms.bc.edu>) as well as the internet address [https://docs.google.com/folder/d/0B2\\_Fr-8JMMzzNW5oVWZqVjExYzQ/edit](https://docs.google.com/folder/d/0B2_Fr-8JMMzzNW5oVWZqVjExYzQ/edit) has electronic copies of all of the lecture notes, syllabus and HW assignments (in MS Word or pdf format) as well as useful internet links. The BC site should have powerpoint slides for the entire class as well as an exam/quiz file of former exams and quizzes with corresponding answer keys. The BC site will also have HW assignment answer keys available after the due date for each assignment. The section number for the McGraw-Hill Connect product is <http://connect.mheducation.com/class/g-griffin-copy-of-section-01> which has "Learn Smart" modules and access to a copy of the e-book on a trial basis.

**Reserve materials:** A copy of the textbook and companion Solutions Manual and Study Guide are on reserve. A copy of Ebbing and Gammons' *General Chemistry 8<sup>th</sup> Ed.* is also available in the library as a source of additional problems.

**General Chemistry II (CHEM101201)**  
**Tentative Course Schedule (Summer 2019)**

Prof. G. William Griffin

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Monday	Tuesday	Wednesday	Thursday	Friday
<b>July 8</b> CH-109 ends; CH-112 Starts	<b>9</b> Chapter 11 CH-110 starts	10 Chapter 12 Quiz 1	11 NO CLASS	12 Chapter 13 Quiz 2
<b>July 15</b> Chapter 14 Quiz 3	16 Chapter 15 Quiz 4	17 Chapter 15 Quiz 5	18 NO CLASS	<b>19</b> EXAM I (Chapters 11-15)
<b>July 22</b> Chapter 15, 16	23 Chapter 16 Quiz 6	24 Chapter 16 Quiz 7	25 NO CLASS	26 Chapter 16 and 22.3 Quiz 8
<b>July 29</b> EXAM II (Chapters 15, 16, 22.3)	30 Chapter 17	31 Chapter 18 Quiz 9	<b>August 1</b> NO CLASS	<b>August 2</b> FINAL EXAM (Chapters 11-18 and 22.3)

Note: The day off in weeks 1 and 3 may be changed by class vote to Friday

Date	Lecture Topics/Exam Dates
July 9	Solids and Liquids (Chapter 11)
July 10	Properties of Solutions (Chapter 12)
July 12	Chemical Kinetics (Chapter 13)
July 15	Chemical Equilibrium (Chapter 14)
July 16	Acid and Bases (Chapter 15)
July 17	Acid-Base Equilibria (Chapter 15)
<b>July 19, 2019</b>	<b>Hour Examination I</b> (Chapters 11-15)
July 22	Salt Hydrolysis (Chapter 15)
July 23	Buffers and Titration Curves (Chapter 16)
July 24	Solubility Equilibria (Chapter 16)
July 26	Complex-Ion Equilibria and Coordination Compounds (Chapters 16 and 22.3)
<b>July 29, 2019</b>	<b>Hour Examination II</b> (Chapters 15, 16 and 22.3)
July 30	Thermodynamics (Chapter 17)
July 31	Electrochemistry (Chapter 18)
<b>August 2, 2019</b>	<b>FINAL EXAMINATION</b> (Chapters 11-18 and 23.2 with emphasis on 17 and 18)