

**GENERAL CHEMISTRY B**

Instructor: Willetta Greene-Johnson, Ph. D., Room 307 Cudahy Science 773-508-3537

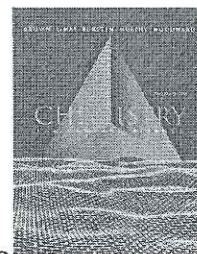
Who am I: A chemical physicist trained in statistical mechanics. I'm interested in (1) thermodynamics (2) Swarming (3) Motor molecules (4) producer, pianist, composer, orchestrator, sequencer, and conductor. My vocal ensemble also has recorded three compact discs—hopefully can do an EP later this year. One of my songs was doubly tracked on a Grammy award winning vocal CD in 2004. The same song was recorded on DVD (released April 2008). Actually that song's been recorded by 5 different artists. I'm also getting more orchestral arrangement contracts—I have an prelude programmed mid-semester with the Memphis Symphony Orchestra. Orchestras rock!

Physical Office Hours: **Wednesday 10:30 A – 11:25 A CS-307**

Email Office Hours (ONLY): **Thursday 10:00 A – 11:00 A wgreene@luc.edu**

Required:

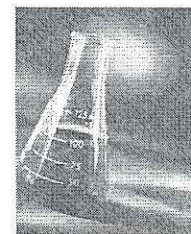
1. **Chemistry, the Central Science. 12th ed. Theodore L. Brown, et. al. Boston: Pearson Prentice Hall: 2011 ISBN: 978-0-321-69672-4.** The *Mastering Chemistry* asset is NOT required in my section
2. **Chemistry 102 Course Packet**, authored by the instructor. This essential lecture packet is available online www.universityreaders.com. The course packet will be mailed to you within a few days of ordering, but you'll have immediate online access to 20% or so once order is completed.



Meetings: Lectures are scheduled MWF in FH-133, at 12:35 P – 1:25 P. You must also be registered in discussion section 006 or 007.

Discussions: meet on Thursdays according to the following schedule:

| Section | Instructor | Location | Time |
|---------|--------------------|----------|-----------------------|
| 006 | Dr. Greene-Johnson | DUM-123 | Th: 11:30 A – 12:20 P |
| 007 | Dr. Greene-Johnson | CSH-313 | Th: 2:30 P – 3:20 P |



Due to the large number of students / focus sections that are matriculated through this course yearly, there can be absolutely no alteration of this schedule.

Course Description: A study of chemical principles with emphasis on the development of a scientific attitude and an understanding of the fundamental concepts of chemistry. Robust pre-calculus concepts will be particularly emphasized the first third of the semester.

Calculators: Any scientific calculator is sufficient, however calculators cannot be shared while exams are in progress and their cases/covers must be removed. Be sure that you are familiar with **your calculator** and that its batteries are **in good condition**, especially on exam days. The student is responsible for remembering to bring his calculator on an exam day.

SAKAI Connection: The syllabus, homework assignments for the semester, discussions, and discussion answers will be posted at the following website: www.luc.edu, look under *Technology*, click on *Sakai*). Students possessing a Loyola email address are able to access this site.

Objective of this course in grander detail:

By the conclusion of this course, the student should experience the following outcomes:


1. **Understand the fundamental principles of physical chemistry**
2. **Acquire a knowledge base of basic terminology and classifications**
3. **Apply concepts creatively as well as methodically to solve multi-tiered problems**
4. **Know how to rank, estimate, analyze and critically evaluate a range of models**
5. **Gain a broader understanding of the role of chemistry in human endeavor**
6. **Appreciate the collaborative and global effort of the scientific enterprise**

Specifically the engaged student should improve in her or his ability to



- **Comprehend the following concepts:**
 - Kinetics, reaction rate, Arrhenius equation, rxn mechanism, rate limiting step
 - Dynamic equilibrium and Equilibrium constants
 - Titrations, Buffers, pH, Lewis and Arrhenius A/B models, Solubility product
 - Complex ions and octahedral Crystal Field theory
 - Electrochemical cells (batteries, fuel cells, transduction, respiration)
 - Spontaneity vs. nonspontaneity, Entropy, cyclic processes, and Free Energy
 - Introduction to nuclear chemistry
- **Identify reagents and general chemical processes:**
 - Identify acids, bases, acidic and basic salts, buffers, solubility rules (Chemistry101)
 - write appropriate net ionic prototypical rxns in aqueous solution
 - be able to closely estimate and accurately calculate pH
 - equilibrium constant K and how it predicts spontaneity status of a reaction
 - complex ion, Lewis bases, geometry of "simpler" complex ions and compounds.
- **Assess outcome feasibility: estimate energy and entropy of chemical processes**
- **Work and exchange ideas with others: cordially solve weekly group problems**
- **Appreciate the impact of chemistry: realize better how chemistry impacts life processes, technology, local, and global issues.**
- **Contribute constructively: as a science-literate, ethically responsible citizen and voter.**

Later this semester, you will receive an emailed invitation to assess me via the IDEA (Individual Development and Educational Assessment). The form provides a thorough diagnostic of how successfully students think the instructor realized the objectives boxed above, as well as the value of the course and other contextual experiences. This opportunity will be available online at <http://www.luc.edu/IDEA> for a one-week time window only, IDEA manual states: 'As student raters, please be aware that the results of your ratings for this class will be included as part of the information used to make decisions about promotion/tenure/salary increases for this instructor. Fairness to both the individual and the institution require *accurate and honest answers.*'


Chemistry 102 Schedule of Topics

| Date | Day | Topic | Chapter | Pages |
|---|-----|---|--------------|---|
| 1/13 JAN | M | Rate of Reactions | 14 | 556-568 |
| 1/15 | W | Integrated Rate Law | 14 | 569-575 |
| 1/17 | F | Arrhenius Equation | 14 | 575-580 |
| 1/22 | W | Rxn mechanisms; Rate limiting step | 14 | 581-588 Th = 1 st discussion |
| 1/24 | F | catalysis | 14 | 589-595 |
| 1/27 | M | Gas phase Equil'm | 15 | 610-618 |
| 1/29 | W | Const. K; Equil. Table | 15 | 619-631 |
| 1/31 | F | van't Hoff equation | 15 | 631-637 |
| 2/3 FEB. | M | Le Chateliér's Principle | 16 | 638-641 |
| 2/5 | W | Acid/Base (= A/B) | 16 | 650-665 |
| 2/7 | F | Extent of Reaction, K_a | 16 | 666-673 |
| 2/10 | M | Categories/Conjugate | 16 | 674-680 |
| 2/12 | W | Review Ch. 14-16 | | OPTIONAL-no handout, so attend! |
| 2/14  | F | Exam 1: Ch.14-16 | IN CLASS | Seating: SKIP Every 3 rd row! |
| 2/17 | M | Salt solutions \leftrightarrow A/B | 16 | 681-694 |
| 2/19 | W | Buffers | 17 | 702-710 |
| 2/21 | F | Titrations SA/SB; SA/WB; SB/WA | 17 | 711-722 |
| 2/24 | M | K_{sp} and ppt equil'm | 17 | 722-725 |
| 2/26 | W | Common Ion Effect | 17 | 726-733 |
| 2/28 | F | Complex Ions (Lewis Acid/Base) | 23 17 | 968-982 689-691 |
| 3/3-7 MAR | M-F | SPRING BREAK | sPrInG BrEaK | Spr. Break Worksheet |
| 3/10 | M | Crystal Field Theory Spont. And Temp. | 23 19 | 987-992 786-793, 797-803 |
| 3/12 | W | Review 16, 17, 23 | | Optional no handout |
| 3/14 | F | EXAM 2: Ch.16,17,23 | IN CLASS | Seating: SKIP Every 3 rd row! |
| 3/17 | M | Gibb's Energy and 2 nd Law: ΔG vs. temp | 19 | 803-810 |
| 3/19 | W | ΔG and Equilibrium | 19 | 811-813 |
| 3/21 | F | Additivity of entropy in Rxns; Redox Review | 19 20 | 814-815 828-829 |
| 3/24 | M | Electrochemistry Voltaic Cell $E^0 = E_{ox}^0 + E_{red}^0$ | 20 | 827-865 |



| Date | Day | Topic | Chapter | Pages |
|---|------|---|--|--|
| MAR 24 (5 PM) LAST DAY TO WITHDRAW WITH A GRADE OF W | | | | |
| 3/26 | W | E_{red}° , E_{ox}° , Spontaneity | 20 | 835-845 |
| 3/28 | F | Work and ΔG | 20 | 845-847 |
| 3/31 | M | Graphical Technique | 20 | In class only |
| 4/2 APRIL | W | Nernst equation | 20 | 849-854 |
| 4/4 | F | E° and equil'm const. Batteries, Fuel cells Electrolysis; Corrosion | 20 | 847-848 854-860 860-863 |
| 4/7 | M | Technology Trends More examples | 20 | See Tech. section in lecture notes |
| 4/9 | W | Nuclear Reactions Nuclear Stability Kinetics, Geol. Dating | 21 | 875-883 887-892 |
| 4/11 | F | REVIEW 19-21 | 20 | Optional may be no handout |
| 4/14 | M | Exam 3: Ch. 19-21 (what we get to in Ch. 21) | IN CLASS | Seating: SKIP Every 3 rd row |
| 4/16 | W | Transmutation | 21 | 884-446 |
| 4/17-4/21 | Th-M | EASTER BREAK  |  | |
| 4/23 | W | Einstein: mass/energy Fission/fusion | 21 | 894-896 896-900 901-906 |
| 4/25 | F | Tech Trends or TBA | | |
| 4/30 | W | REVIEW for FINAL Check emails regularly | 12:35 P-1:30 P | FH-133 |
| 5/2 MAY | F | FINAL EXAM: Ch. 14-17,19-21 | 9:00 -11:00 A | TBA (FH-133 probably) |

Representative Problems, End of Chapter Problems & Discussions:

Students who are making good progress in the course should be able to solve, independently, most or all of the end-of-chapter problems in the text. You should attempt to work out as many example problems and end-of-chapter problems as possible before taking exams. A group of representative problems is listed below as assigned problems. The solution manual with the worked out problems will be kept on reserve in Cudahy Library. A comprehensive review containing additional problems will be posted approximately one week before the midterm exams, which also serves for the final exam.

Discussions count 10% of grade, and should be attended. Discussion problems will be given to be attempted by groups of 3-4 students within the 50-minute discussion. Students must stay the entire period (unless otherwise instructed) and work on assigned discussion problem(s) to earn up to 10% of grade. The solutions will be posted on blackboard, discussions will be returned by the following discussion, or during the same week if a Friday exam occurs in that week. The student is strongly encouraged to attempt all suggested problems (text-book and discussion) and contribute significantly to the group discussion activity. Student's extent of group participation will be noted.

Assigned Exercises:

| chapter | page | Problems (*means more involved; ** means unassigned reading may be required) |
|---------|------|---|
| 14 | 597: | 3, 5, 6, 9, 11, 15, 21 a and c, 23, 27, 29, 33, 37, 38*, 41, 43, 47, 57a., 61, 63, 73, 75, 85, 99 |
| 15 | 642: | 2, 7, 11, 15, 17, 19, 23, 25, 27, 33, 35, 37, 39, 45, 51, 55, 57, 63, 65 & 67. For your information % ionization $\equiv \frac{x}{x_0} \times 100\%$ where x_0 = starting amount, unit usually is M] |
| 16 | 694: | 1, 3, 5, 15, 19, 25, 27, 31, 39 (has two separate questions in it, answer <u>both</u>), 53, 55, 59, 61, 67, 73, 75, 79, 83, 101, 107, 7*, 9* (FYI: $[H_3O^+] \equiv [H^+]$, Appendix D = pg. 1062) |
| 17 | 740: | 4, 6, 10, 19, 21, 23, 27, 29, 35, 37, 41, 43 abdf, 51 (missing unit "gram"), 55, 59a, 67b, 71, 83, 92, extra: 11** note: K_a , K_b and K_{sp} involved in some problems concurrently. |
| 19 | 784: | 4, 5, 6, 9, 11, 13, 23, 25, 41, 49 a,c,d, 53, 57, 59, 63 (alternatively: can you predict sign of ΔS_{rxn} (\pm) <u>without recourse</u> to entropy tables?), 66, 69, 71, 98, 104; extra: 94, 106** |
| 20 | 867: | 2, 4, 7, 12, 13, 15, 17, 27, 33, 35 a-c, 37, 39, 43, 51, 53 (should be E_{rxn}^\ominus , not E_{red}^\ominus) 65, 77a-c, 89, 91, 102, 110, 118 extra: 69** (no extra reading, but extra thought) |
| 21 | 909 | 1, 7, 9, 11, 15, 19, 21, 25, 27, 33, 35, 39, 41, 43, 45 (1 st question), 59 extra: 82, 83 |
| 23 | 997: | 25, 29, 33, 37, 38, 43, 45, 47, 53, 55, 73 extra nerdy: 10, 79, 80 |

Academic Honesty:

All students are expected to exercise the highest level of academic honesty while taking exams. Each is expected to take time to read the University policy on academic honesty located at

http://www.luc.edu/academics/catalog/undergrad/reg_academicintegrity.shtml.

Grading Scheme:

There are two grading schemes, and whichever one yields the higher grade will be employed after the final has been taken:

If all midterms went fairly well: 20 % midterm, 10% discussion, 30% final

If one midterm not so good: 20% the other two, 10% discussion, 50% final

Grading Scale: As recommended by the Dean's Office

| | | | | | |
|---------------------|--------------|-------------|--------------|--------------|----------------|
| Grade Scale: | A | ≥ 90 | A- | 87-89 | |
| B+ | 84-86 | B | 80-83 | B- | 77-79 |
| C+ | 74-76 | C | 70-73 | C- | 67-69 |
| D+ | 64-66 | D | 60-63 | F | < 60 |

Please note that the final examination must be taken. Failure to take the final exam will result in the grade "F". If a student has missed the final for some valid reason, she/he must present her/his appropriate Dean's office with reasonable proof of illness or accident, verified by a doctor's note, police report, etc., in order to take the makeup final on a single date designated by the Dean's office. There is also a fee. *There is no guarantee that any coverage indicated for the regular final will apply to the content of the makeup final.* Failure to follow through on this situation will result in the student automatically receiving an "F" in the course.

Examinations

Three hour exams and the final exam will be given on Feb. 14, Mar. 14, April 14, and May 2, respectively, also noted in the schedule, 90% of your course grade will be determined from these as explained further below. The other 10% will be determined from your discussion grades. The exams are cumulative, *i. e.*, may include material that has been queried on previous exams. The final exam is cumulative.

Laboratory

Chemistry 112, the general chemistry laboratory course, should be taken concurrently with the lecture course in general chemistry. The lecture and the laboratory courses are graded independently. Students should first consult the Chemistry Department Bulletin opposite the wall facing the chemistry office for information. Then, if they still have unresolved issues, they should contact Dr. Angela Boerger, the administrator of the laboratories.

Flanner Hall-133 Room Instructions on Exam Days

- 1) When you enter the auditorium, **go to the front** and **place** your **book bag** there. **Remove** your **calculator slipcover** and placed it in book bag.
- 2) Starting from the first row nearest the lectern, **sit quickly** in every other seat and **skip every third row**. This vacant third row provides an aisle for the proctor to walk through and address any appropriate questions that student may have during exam. Do not try to sit with friends or near one's usual area. The exam is only **50 minutes**, so excessive delays will cut into exam-taking times.
- 3) **Place your student ID conspicuously** on your desk so that attendance may be noted (during exam).
- 4) Have **several pencils/pens, eraser, etc.** and a **calculator** in good **working** order.
- 5) Proctors have been instructed to **confiscate the exams of any student** using a calculator with its slipcover in place or **whose actions are suspect**.
- 6) **Read over the entire exam**. You may find a problem in the middle, or at the end, that suits you better to start. The three or so minutes spent glancing over the entire exam will be more than compensated for by the strategy and priorities that you formulate. The recommended **order to do problems** is:
 - (1) what you **know well FIRST**
 - (2) what you're sure you **can at least start NEXT**
 - (3) what you **haven't have a clue LAST**

I have tried to arrange problems in a reasonable order, but my perception and the student's will certainly differ in some aspects. So, take a few minutes to read over the exam and **devise your own strategy**.
- 7) When you have **concluded, turn in your exam** to a proctor. Then **leave as quietly** and as expeditiously as possible as to not disturb other exam takers.
- 8) Normally exams administered on Friday will be returned no later than the following Wednesday.

Advanced Studies Recommendation Protocol

Later in your student career, you may require recommendations for graduate school, medical school, or the like. In my case, the following policy is invoked:

1. Student must generally possess GPA of 3.4 or above. However, if my time allows, a student might be considered if she or he presents a **written explanation** that reveals an exceptional circumstance accounting for a lower grade point average.
2. Student must provide a Microsoft Word-formatted document listing his/her official transcript GPA, contact information, deadline(s), and also all chemistry, biology and physics courses and labs that the student has take—in the following format:
 - a. GPA
 - b. reliable, current email and telephone # that student checks *regularly*
 - c. **DEADLINE**
 - d. Table with header: course taken, instructor, grade

Example, feel free to CUT and PASTE :

| Course | Semester / year | Instructor | Grade |
|---------------|-----------------|-----------------|-------|
| Chemistry 102 | Spring/14 | Dr. WGJ | A- |
| Biology 151 | Fall/ 13 | Dr. Castignetti | B+ |

- e. If applying “outside the Committee”—see items 4, 5 below, a list of all schools of the applicant and **ALL of their DEADLINES**.
 - f. All cover forms, application packages, envelopes in one binder, folder, or otherwise secure containment, with like items paper-clipped together.
3. I'd love to read your personal statements, even in rough draft form. It tells me something about you and helps me to shape a recommendation. This article is not required, but I recommend it.
 4. **It is STRONGLY recommended that the student applies through the Loyola Pre-Health Advisory Committee.** The Committee is well regarded by the medical/dental/pharmaceutical community, and its voice of endorsement will be a plus in student's application process. Also, eventually the student's personal statement, etc. must be strong, and well written. If the student applies via Committee, s(he) should provide a cover sheet obtained from the Office of Pre-health on the 2nd floor of Damen Hall.
 5. If the student who I can recommend elects to apply outside of committee (apart from the Pre-Health Advisory committee), then she/he must email me at wgreene@luc.edu (and at least one other e-address). I will send student a doc file attachment. The student must open this file and type in each school or college address, **creating as many documents as the number of schools to which he/she intends to apply.** The student then must attach those documents and email all the attachments, in one email, to me.

**LOYOLA UNIVERSITY CHICAGO SPRING CALENDAR 2014**

| | | |
|--------------------------|--------------------------------|--|
| January 12 (midnight) | Sunday | Open registration ends |
| January 13 | Monday | Spring Semester 2013 begins Late and Change Registration begins Late registration fees apply |
| January 20 | Monday | Martin Luther King, Jr., Holiday: No classes |
| January 21 | Monday | Late and change registration ends Last day to withdraw without a "W" grade |
| January 27 | Sunday | Last day to drop class(es) with a Bursar credit of 100% |
| January 28 | Monday | Last day to convert from credit to audit or vice versa |
| February 10 | Sunday | Last day to drop class(es) with a Bursar credit of 50% |
| February 11 | Monday | Summer 2013 Registration begins |
| February 13 | Wednesday | Ash Wednesday: Classes meet; Special services |
| February 16 | Sunday | Last day to drop class(es) with a Bursar credit of 20% (zero credit thereafter) |
| February 24 | Monday | Last day for students to submit assignments to change an "I" grade to a letter grade for Fall Semester 2008; Faculty may set earlier deadlines with students |
| February 26 | Wednesday | Early Alert process begins (middle of 7 th week) |
| March 1 | Saturday | Last day to file applications for degrees awarded in December 2014 (Deans' offices) |
| March 3 - 8 | Monday-Saturday | Spring Break: No classes |
| March 10 | Monday | Classes resume after Spring Break |
| March 24 (5:00 P) | Monday | Last day to withdraw with a grade of "W" After this date, the penalty grade of "WF" will be assigned |
| April 7 | Monday | Fall Semester 2013 Registration begins |
| April 17 - April 21 | Th(4:15) - M(4:15) | Easter Holiday |
| April 25 | Friday | Spring Semester classes end |
| April 30 | Wednesday | Study Day: No classes |
| April 28 - May 6 | Monday-Saturday Mon., Tues. | 102 Chemistry Final convenes May 2 2014 (Friday) from 9:00 A to 11:00 A |

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Manager: Dionne Damico **Email Address:** luc-lsc@bkst.com