CHEM 106: Basic Inorganic Chemistry
Spring 2016
Loyola University Chicago

	Instructor:	**Laboratory Instructor & Assistants:**			**SI Tutors:**	
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Office hours:	W 1:30-2:30 pm Th 2:30-3:30 pm & by appointment	M & W: 10:30-11:15 & by appointment	by appointment	by appointment	T 5-7 pm	T 11:45-12:45 pm, W 12:30-1:30 pm, & F 1:45-2:45 pm

	Lecture	*Lab Sections*	*Discussions*
Class Meeting Times:	TuTh 1:00-2:15 pm Flanner Hall Auditorium	W 11:30-2:30 pm & W 2:45-5:50 pm Flanner 305	Tu 10:00-10:50 pm & Tu 11:30-12:20 pm Cuneo 312

Course Description
This course is a lecture, discussion and laboratory course for chemistry majors and is a continuation of CHEM 105. Specific areas addressed are: properties of solutions, kinetics, equilibrium, chemical thermodynamics, and electrochemistry. Historical and current developments in chemistry as well as real problems that chemists address will be incorporated into the course. The laboratory involves the techniques and procedures of inorganic synthesis and analysis.

The emphasis of this course is on understanding and prediction rather than memorization. This means that students must foster their problem solving skills, ability to make claims based on evidence, and effective communication of laboratory endeavors. It is not enough to know *what* happens in chemistry, the student must also be able to explain *why* it happens.

Course Prerequisites
Successful completion (C- or better) in CHEM 105 and MATH 118 or equivalent.

Required Resources

(1) Brown, T. L., et. al (2015). *Chemistry: The Central Science, 13th ed (with MasteringChemistry).* Pearson Prentice Hall. ISBN 978-0-321-91041-7. MasteringChemistry course ID is: **DAUBENMIRESPRING2016**
(2) Moog, R.S. & Farrell, J.J. (2015). *Chemistry: A Guided Inquiry, 6th ed.* John Wiley & Sons, Inc. ISBN 978-1-118-64004-3
(3) Custom laboratory manual ($50, purchase from Dr. D., checks made payable to: *Patrick Daubenmire*)
(4) *Sakai Connection*, sakai.luc.edu

Connection to the "Hungers" of Loyola University's Transformative Education
This course seeks to assist each student in fostering hungers associated with the University's model of transformative education[1]. The study of introductory chemistry can assist in development of the specific hungers below:

- A *Hunger for Integrated Knowledge* – by building an understanding of a variety of chemical concepts and applying them to problems in many contexts.
- A *Hunger for a Moral Compass* – by examining the variables, benefits, and detriments that exist at the interface of applied science, technology, environment, and society.
- A *Hunger for a Global Paradigm* – by understanding that chemistry is a human endeavor and it resides in the tension between helping and harming life.

Instructional Format – Process Oriented Guided Inquiry Learning (POGIL)
This course will not follow a traditional lecture format for delivery of course content and skill development. Instead this course will capitalize on students' current prevailing ideas and thoughts about sets of data or presented models. Then, through guided questions about the presented information, students, in small groups, discuss ideas and come to consensus about answers to questions. Ideas are further developed in questions that force application of the agreed upon concepts. The instructor is the guide on this journey, pointing out areas that are particularly relevant or that may need attention. This format is designed based on the idea that learning cannot be directly transmitted from one person to another. Knowledge must be built by the learner which results from interpretation and reflection on experiences in particular contexts, such as the chemistry classroom, and when working with others.

[1] http://www.luc.edu/transformativeed/

The roles you may have throughout the semester when working in groups include:

- *Manager*: The student in this role ensures that the group is functioning efficiently and progressing within the time frame set by the instructor. This student is not a supervisor, but a full participant. Additionally, this student monitors the participation of all group members to make sure all ideas have been heard.

- *Recorder*: The student in this role transcribes the agreed upon responses of the group to questions and problems. The recorder is not solely responsible for doing the work, but is responsible for accurately recording the results of the group's work. There will be times during the semester when the group's answer(s) to certain questions will be collected. The recorder submits these responses.

- *Technician*: The student in this role primarily handles calculations and the management of equipment for the group. If special operating instructions are needed for an instrument during an activity, the technician is the point person for these applications and will be trained as necessary.

- *Presenter*: The student in this role represents the group during all class discussions or during inter-group interactions. Similarly to the recorder, the presenter's responses should accurately reflect the results of the work of the group.

Academic Honesty
Academic honesty is an expression of interpersonal justice, responsibility and care, applicable to Loyola University faculty, students, and staff, which demands that the pursuit of knowledge in the university community be carried out with sincerity and integrity. The School of Education's Policy on Academic Integrity can be found at: http://www.luc.edu/education/academics_policies_integrity.shtml. For additional academic policies and procedures refer to: http://www.luc.edu/education/academics_policies_main.shtml

Accessibility
Students who have disabilities which they believe entitle them to accommodations under the Americans with Disabilities Act should register with the Services for Students with Disabilities (SSWD) office. To request accommodations, students must schedule an appointment with an SSWD coordinator. Students should contact SSWD at least four weeks before their first semester or term at Loyola. Returning students should schedule an appointment within the first two weeks of the semester or term. The University policy on accommodations and participation in courses is available at: http://www.luc.edu/sswd/

Harassment (Bias Reporting)
It is unacceptable and a violation of university policy to harass, discriminate against or abuse any person because of his or her race, color, national origin, gender, sexual orientation, disability, religion, age or any other characteristic protected by applicable law. Such behavior threatens to destroy the environment of tolerance and mutual respect that must prevail for this university to fulfill its educational and health care mission. For this reason, every incident of harassment, discrimination or abuse undermines the aspirations and attacks the ideals of our community. The university qualifies these incidents as incidents of bias.

In order to uphold our mission of being Chicago's Jesuit Catholic University-- a diverse community seeking God in all things and working to expand knowledge in the service of humanity through learning, justice and faith, any incident(s) of bias must be reported and appropriately addressed. Therefore, the Bias Response (BR) Team was created to assist members of the Loyola University Chicago community in bringing incidents of bias to the attention of the university. If you believe you are subject to such bias, you should notify the Bias Response Team at this link: http://webapps.luc.edu/biasreporting/

Safety
Students must adhere to proper safety protocols and practices when conducting classroom activities and laboratory investigations. A separate agreement describing these practices must be signed before a student may participate in coursework.

Course Evaluation
Grades will be assigned in the course according to the following sources:

Table 1. Grade Criteria

Criteria	Maximum Percent Value
CHEM 106 – Lecture, Lab, Discussion (4.0 credits)	
participation, group responses, and reports	5 %
online quizzes & homework sets	10 %
laboratory preparation & weekly SWH reports	10 %
tests	25 %
laboratory problem reports & calibrated peer review	20 %
final exam	30 %

Participation, group responses and reports will be an important part of the class. This work will be a combination of individual and group work. Students must be present during class sessions in order to receive credit for these assignments. The two lowest scores on these assignments will be dropped from your course evaluation.

Online quizzes will be administered via *MasteringChemistry* at the end of nearly each week during the discussion time, specifically from 2:45-3:15 pm on Fridays. Content from the previous sessions (whole class and small group) will be the source of material on each quiz. The two lowest quiz scores will be dropped from your course evaluation.

Online Homework Sets will be assigned weekly. Submitted responses must be the result of your individual effort and synthesis and are due before 12 noon on the following Monday. The two lowest homework sets scores will be dropped from your course evaluation.

Laboratory Preparation & Weekly Science Writing Heuristic (SWH) Reports will be a regular part of weekly laboratory work. Pre-laboratory assignments are to be completed prior to each laboratory session, and the written weekly lab report is due by the beginning of the next lab session. The two lowest scores in this category will be dropped from your grade evaluation.

Written Reports to Laboratory Problems will be assigned at three different points in the semester. These problems will require students to use skills and ideas developed in prior laboratory activities in order to formulate an acceptable solution and full written report to communicate results effectively.

Calibrated Peer Review (CPR) is online writing and critical thinking process in which students, once trained, provide personalized feedback to other students on written work. This process will be used with the full written reports.

Tests will be administered at two different points during the course. Each will primarily reflect the content and concepts developed during prior class sessions.

The *Final Exam* will be designed to assess students comprehensive knowledge of concepts and skills developed during the work of the semester.

Table 2. Proposed Grading Scale

92.00% or greater	A
91.99% - 90.00%	A-
89.99% - 88.00%	B+
87.99% - 82.00%	B
81.99% - 80.00%	B-
79.99% - 78.00%	C+
77.99% - 72.00%	C
71.99% - 70.00%	C-
69.99% -68.00%	D+
67.99% - 60.00%	D
59.00%-0.00%	F

Practices for Success

Supporting claims with evidence, making applications, solving and analyzing problems, and using chemical principles to explain phenomena are critical skills in the field of chemistry. The development of these skills is not without some frustration, but it carries the reward of deepening one's ability to think critically and solve problems in any field. To do this, one may have to assess, evaluate, and possibly revise approaches to learning. The use of targeted, guiding questions, regularly scheduled work, and strategic study plans can greatly assist the learning of chemistry. With such a focus, hopefully any frustration will quickly turn to appreciation and fascination for the relevance and connectedness of chemistry in your life and within the world around you. Solving and analyzing problems is the most important feature of this work. If, at any time, you need assistance framing such plans for your work in chemistry, please do not hesitate to ask the instructor.

Norms of Course Proceedings

The classroom is to be a safe place to question and explore ideas. Student and teacher voices are important to this work. Collegial disagreement can be a healthy part of this process, but must always include respect for all members of the class.

Course activities will be designed to help students reach the goal of learning chemistry content and developing thinking skills. This will more often driven by the use of data and reasoning to discover concepts and solutions rather than the identification and exchange of chemical facts and algorithms.

Class sessions will begin and end on time. All students should attend class regularly and participate in class discussions. Multiple absences could affect one's ability to learn chemistry during this semester. Anticipated absences should be discussed with the instructor two class days before the absence. Proper documents may be requested to verify the reason for any absence. This is particularly relevant to days missed that include an in-class assessment for which a student is asking for a make-up.

Cell phones and the use of texting devices should be used in appropriate and professional manner. These devices should not distract other participants in the course.

Email messages among students in the course should also be respectful, appropriate, and professional. Response time to email messages is acceptable within 48 hours.

Completed course assignments must be submitted at the beginning of the class session or by the time specified on the due date. Late assignments may not be accepted without proper verification of reasons.

Table 3. Proposed Semester Topics & Schedule[2]

Date (Week)	Session	Topics	Resources & Practice	Assignments Due
Week 01: Jan 17-23	Discussion & Class Sessions	CHEM 105 Highlights; Introduction to Chemical Equilibrium	14.1, 14.2, & Chapter 15 (BLBMW); CA 36-38 (Moog & Farrell)	*Homework #01* (due by 10 pm on Monday, Jan. 25) *Quiz #01* (timed, and due by 10 pm on Tuesday, Jan. 26)
	Lab Session 01	*Check-In & orientation to laboratory format and work*	Lab Manual	
Week 02: Jan. 24-30	Discussion & Class Sessions	Working with and Applying Equilibrium Constants	Chapter 15 (BLBMW); CA 39-41 (Moog & Farrell)	*Homework #02* (due by 10 pm on Monday, Feb. 01) *Quiz #02* (timed, and due by 10 pm on Tuesday, Feb. 02)

[2] The schedule of topics is approximate. Depending on class needs, some topics may need more time, and we will adjust the schedule accordingly. Test and exam dates, however, do not change. The content of those assignments, though, will be adjusted to align with any schedule changes.

Date (Week)	Session	Topics	Resources & Practice	Assignments Due
	Lab Session 02	*SWH #07* – Chemicals in Your Home	Lab Manual, p. 76	SWH #07 pre-lab assignment
Week 03: Jan. 31-Feb. 06	Discussion & Class Sessions	Acids, Bases, & Equilibrium	Chapter 16 (BLBMW); CA 42-45 (Moog & Farrell)	*Homework #03* (due by 10 pm on Monday, Feb. 08) *Quiz #03* (timed, and due by 10 pm on Tuesday, Feb. 09)
	Lab Session 03	*Lab Problem #04* – The Great White (Chemical) Way	Lab Manual, p.80	*SWH Report #07* (Wednesday, Feb. 03)
Week 04: Feb. 07-13	Discussion & Class Sessions	Continuation with Acid-Base Equilibria	Chapter 16 (BLBMW); CA 46 & 47 (Moog & Farrell)	
	Lab Session 04	*CPR for Lab Problem #04*	Online Calibrated Peer Review (CPR)	Report for Lab Problem #04, uploaded to the Calibrated Peer Review system by 10 pm Tues., Feb. 09.

Date (Week)	Session	Topics	Resources & Practice	Assignments Due
Week 05: Feb. 14-20	Discussion & Class Sessions	*TEST #01* (Tuesday, Feb. 16 Discussion & Lecture); Additional Aspects of Aqueous Equilibria	Chapter 17 (BLBMWS)	*Homework #04* (due by 10 pm on Monday, Feb. 22) *Quiz #04* (timed, and due by 10 pm on Tuesday, Feb. 23)
	Lab Session 05	*SWH #08* – Freezing Point Matters	Lab Manual, p. 81	CPRs completed by 10 pm on Tues., Feb. 16 SWH #08 Pre-laboratory assignment
Week 06: Feb. 21-27	Discussion & Class Sessions	The Electrochemical Cell & Cell Voltage	Chapter 20 (BLBMWS); CA 48-51 (Moog & Farrell)	*Homework #05* (due by 10 pm on Monday, Feb. 29) *Quiz #05* (timed, and due by 10 pm on Tuesday, Mar. 01)
	Lab Session 06	*SWH #09* – More Reversible and Irreversible Processes	Lab Manual, p. 87	SWH #08 Report & SWH #09 Pre-laboratory assignment

Date (Week)	Session	Topics	Resources & Practice	Assignments Due
Week 07: Feb. 28-Mar. 05	Discussion & Class Sessions	Chemical Thermodynamics & Entropy	Chapter 19 (BLBMWS); CA 52-54 (Moog & Farrell)	*Homework #06* (due by 10 pm on Monday, Mar. 14) *Quiz #06* (timed, and due by 10 pm on Tuesday, Mar. 15)
	Lab Session 07	*SWH #10* Spectrophotometry and Equilibrium	Lab Manual, p. 93	SWH #09 Report & SWH #10 pre-laboratory assignment
Week 08: Mar 06-12	SPRING BREAK – NO CLASS SESSIONS			
Week 09: Mar. 13-19	Discussion & Class Sessions	Chemical Kinetics	Chapter 14 (BLBMW); CA 55-57 (Moog & Farrell)	*Homework #07* (due by 10 pm on Monday, Mar. 21) *Quiz #07* (timed, and due by 10 pm on Tuesday, Mar. 22)
	Lab Session 09	*SWH #11* – Interactions of Acids and Bases	Lab Manual, p. 97	SWH #10 Report & SWH #11 Pre-laboratory assignment

Date (Week)	Session	Topics	Resources & Practice	Assignments Due
Week 10: Mar. 20-26	Discussion & Class Sessions	Chemical Kinetics cont.	Chapter 14 (BLBMW); CA 59-62 (Moog & Farrell)	
	Lab Session 10	*Lab Problem #05 – pHun is pHinding pK_a*	Lab Manual, p. 103	SWH #11 Report & Preparation for Lab Problem #05
Week 11: Mar. 27-Apr. 02	Discussion & Class Sessions	*TEST #02* (Tuesday, Mar. 24; Discussion & Lecture); *Topics TBD*		*Homework #08* (due by 10 pm on Monday, Apr. 04) *Quiz #08* (timed, and due by 10 pm on Tuesday, Apr. 05)
	Lab Session 11	*Calibration for Peer Review Process*	Online Calibrated Peer Review (CPR)	Report for Lab Problem #05, uploaded to the Calibrated Peer Review system by 10 pm Tues., Mar. 29
Week 12: Apr.03-Apri 09	Discussion & Class Sessions	*Topics TBD*		*Homework #09* (due by 10 pm on Monday, Apr. 11) *Quiz #09* (timed, and due by 10 pm on Tuesday, Apr. 12)

Date (Week)	Session	Topics	Resources & Practice	Assignments Due
	Lab Session 12	SWH #12 – Solubility Constants	Lab Manual, p. 104	CPRs completed by 10 pm on Tues., Apr. 05 SWH #12 pre-laboratory assignment
Week 13: Apr. 10-16	Discussion & Class Sessions	*Topics TBD*	tbd	*Homework #10* (due by 10 pm on Monday, Apr. 18) *Quiz #10* (timed, and due by 10 pm on Apr. 19)
	Lab Session 14	*SWH* #13 – Rate Laws: A Decomposition Reaction	Lab Manual, p. 107	SWH #12 Report & SWH #13 Pre-laboratory assignment
Week 14: Apr. 17-23	Discussion & Class Sessions	*Topics TBD; Semester Review*	tbd	*Homework #11* (due by 10 pm on Monday, Apr. 25) *Quiz #11* (timed, and due by 10 pm on Apr. 26)
	Lab Session 14	*Lab Problem #06 – Drip, Drip, Drip*	Lab Manual, p. 112	SWH #13 Report & Preparation for Lab Problem #06

Date (Week)	Session	Topics	Resources & Practice	Assignments Due
Week 15: Apr. 24-30	Discussion & Class Sessions	*Topics TBD; Semester Review*	tbd	
	Lab Session 15	Final surveys & assessments; clean-up and check-out		Report for Lab Problem #06 uploaded to the Calibrated Peer Review system by 10 pm Tues., Apr. 26; CPRs completed by Sun., May 01
Exam Week	Friday, May 06, 1-3 pm	CHEM 106 FINAL EXAM, Flanner Hall Auditorium		