



General Chemistry for Engineering

CHEM 171-001 Course Syllabus

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Institute: Loyola University Chicago Department of Chemistry & Biochemistry

Date: 8/28-12/16 Mo/We/Fr at 08:15-09:05 AM. Flanner Hall - Room 7.

Version: 8/28/2023. *Changes to this syllabus may be made when deemed appropriate.*

Course: CHEM 171-001, General Chemistry for Engineering, 3 Credits.



Preparing people to lead extraordinary lives.

<https://sakai.luc.edu/x/NKqa6T>


Introduction

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1.1 Course Details and Policies


1.1.1 Office Hours

Wednesdays at 9:20–11:20 AM. Office hours are held in Flanner Hall 409.

 **Note** For all other times, one should make an appointment via [email](#), preferably two days in advance.

1.1.2 Office Hour Policy

Office Hour (OH) is one of the Resources for Help, available to give students a regular set of times every week to have access to talk to the instructor outside of scheduled classes. For regular OH, just show up! Bring your questions, fully or partially formed, anytime during the times listed. Bring a classmate with you or meet your classmates online to work together, get feedback, and help. All students are encouraged to attend office hours regularly to ask questions or to discuss any issues that arise during the semester. Private conversations can occur by request - just show up!

 **Note** No appointment is needed for regular OHs.

1.1.3 Time Zone

This syllabus lists dates/times using Chicago local time (U.S. Central Time Zone).

1.1.4 Class Meetings

	Days & Times	Room
CHEM 171-001 Lecture	8/28–12/16 Mo/We/Fr at 08:15–09:05 AM	Flanner Hall - Room 7
CHEM 171-002 Discussion	Fr 09:20-10:10 AM	Flanner Hall - Room 7



Note Attendance will be taken in class meetings and will have 5% weight in the overall course grade. Every meeting has 2 points towards attendance category. Missing a class due to an official excuse will have 1 point attendance grade per class meeting, if the instructor is notified before class meetings on these days.

1.1.5 Email Policy

I require that our lecture course, CHEM 171-001, is listed in the email subject line. Here is how to do this:

- Reply to one of emails that I sent from Sakai to the entire class.
- Use Email in Sakai send to me: Instructor, via Select Recipients, and leave the subject line blank.
- Use your Loyola email and put: **CHEM 171-001** in the subject line, send to mkahveci@luc.edu.

In most cases I will be able to respond within 48 hours Monday – Friday when classes are in session. You are encouraged to use office hours to get immediate answers to your questions, and to use your classmates as resources for help.

1.2 Course Materials

1.2.1 Textbook/Online Homework

“Chemistry for Engineering Students”, 4th edit. by Larry Brown and Tom Holme (Cengage Learning, Inc., 2019) ISBN 978-1-337-39890-9 is required. The Student Solutions Manual with Study Guide, ISBN 978-1-337-39906-7 is recommended.

To access the online homework system, Cengage OWL registration is required. Please follow these steps:

- Connect to <https://www.cengage.com/dashboard/#/course-confirmation/E-XT9W26F65XWLD/initial-course-confirmation>
- Follow the prompts to register your OWLv2 course.
- During this process you may purchase the textbook as a bundle.
- Temporary Access: You can access OWLv2 for this course until 00:00 AM (UTC) on 09/11/2023 for free. At the end of the temporary access period, you will be prompted to purchase access. Your work will be saved and will be available to you again once you’ve completed your purchase.

1.2.2 Lecture Notes

Lecture notes/handouts for each chapter will be made available electronically. Typically pre-lecture notes are posted 15 minutes before the class meetings. The location for pre-lecture notes:

Sakai → Resources → Pre-Lecture

Students are expected to “fill in the blanks” (take notes) with calculations, chemical equations, and structures in the handouts as the lectures proceed. When set of notes is completed for a Chapter, a completed version will be posted in:

Sakai → Resources → Post-Lecture

1.2.3 Other Materials/Resources

- Computer and mobile device (phone, tablet) for connectivity to online resources.
- Accommodation requests must be discussed with Instructor at least one week before a test.
- Scientific Calculator without memory capacity to store any course related formulas.

- Loyola Sakai course management site: <https://sakai.luc.edu/portal> and tools integrated into the site (e.g. Panopto, Tests & Quizzes).
- Loyola email. Messages are sent to the entire class via Sakai linked to your Loyola email account.
- Additional web-based systems will be used for uploading your work and facilitating feedback and evaluation. Registration will be free but required. These may include GradeScope, Flipgrid, and other sites.
- Additional software will be used. Downloads will be free but required. These may include applications that convert photos to pdfs (examples: CamScanner, Scannable, GeniusScan), collaboration materials for group work (examples: JamBoard, OneNote), testing-related software approved by the University (e.g. Respondus Browser), and others.

1.3 Course Description and Objectives

To acquaint students with fundamental concepts of chemistry and their applications in engineering science. Multiple perspectives of matter will be used to describe and explain characteristics, properties, and relationships across the following topics: atoms and molecules, solutions, reaction kinetics, equilibria, acids and bases, reaction thermodynamics, electrochemical reactions.

Students will deepen their understanding of foundational concepts of chemistry and advance their skills in scientific problem solving, critical thinking and synthesis of concepts, such that students will be able to do the following:

- Use multiple perspectives of matter (macroscopic, particle, symbolic levels) to qualitatively describe and explain characteristics, properties, and relationships of the following: atoms and molecules, solutions, reaction kinetics, equilibria, acids and bases, reaction thermodynamics, and electrochemical reactions.
- Quantify relationships between variables controlling chemical systems.
- Solve quantitative multistep problems combining multiple concepts within the systems.
- Differentiate among closely related factors, categorize problem types, and select appropriate tools to solve these problems.
- Apply chemical principles to explain natural phenomena.

1.4 Class Attendance & Course Coverage

Attending to the Lecture and Discussion meetings are mandatory (also see [Professionalism \(5%\)](#), pp. 8). You will have the chance to introduce yourself to multiple classmates early in the course. Our actual pace may vary from the tentative schedule, [Tentative Schedule of the Course](#) (pp. 11). If you miss a class for any reason, it is your responsibility to work through the content along with the lecture recording/lecture notes once it is posted, and I also suggest you contact a classmate for further discussion of the topics as you are still responsible for all material covered and assigned.

1.5 Important Deadlines

- Sunday 9/10/2023: Last day to withdraw without a mark of "W"
- Monday 9/11/2023: Last day to convert from credit to audit or vice versa
- Monday 9/11/2023: Last day to request or cancel pass/no pass option

- Friday 11/3/2023: Last day to withdraw from session without a penalty grade of "WF"; midnight

1.6 Classroom & Group Work Guidelines

The classroom is a space designed for learning. My expectations are that all voices will be heard and appreciated in the classroom, and that we will invite each other to engage while recognizing that contributions can take multiple forms.

1.7 Student and Faculty Expectations

I expect you to take ownership of your learning. For this course, it is anticipated that the average independent working time (outside of class) required to learn the material in order to achieve a minimal passing grade of $C-$ is 1 – 2 hours per day, every day, but your needs will also vary depending on your prior knowledge and ability to master cumulative concepts in the course material as the semester progresses. What can you expect of me? My primary objectives are to provide you with the tools, environment, encouragement, and support to learn Chemistry. Because the course objectives are based on what students will learn, my teaching techniques include the use of pre-lecture homework (i.e. reading assignments listed per meeting day as indicated in [Tentative Schedule of the Course](#) (pp. 11), active learning and metacognition, to help you maximize your learning. I expect that all of us will work together!

1.8 Pass/Fail Conversion Deadlines and Audit Policy

A student may request to convert a course into or out of the "Pass/No-Pass" or "Audit" status only before its deadline. For the Fall 2023 semester, students are able to convert a class to "Pass/No-Pass" or "Audit" through Monday 9/11/2023. Students must submit a request for Pass/No-Pass or Audit to their Academic Advisor.

1.9 Health, Safety, and Well-Being On-Campus

Please be familiar with and adhere to all policies and protocols posted on the Campus Info & Resources site: <https://www.luc.edu/healthsafetyandwellbeing/campusinforesources>.

1.10 Laboratory

General Chemistry laboratory, Chem 173 should be taken concurrently with this course.

1.11 Course Repeat Rule

Effective with the Fall 2017 semester, students are allowed only **three attempts to pass Chemistry courses with a $C-$ or better grade**. The three attempts include withdrawals (W). The Department advises that it is preferable to complete a course with a grade of C or $C-$, and to demonstrate growth in future coursework, than to withdraw from a course.

1.12 Student Accommodations

The Student Accessibility Center (SAC, formerly known as SSWD), Sullivan Center (773-508-3700), <http://www.luc.edu/sac>, has the mission “to support, service, and empower Loyola University Chicago students with disabilities” and to “Partner with faculty and staff to provide opportunities for collaboration, professional development, personal growth, and staff interaction, as they relate to students with disabilities.” Please direct all questions concerning accommodations of disabilities to the Student Accessibility Center. Academic accommodations afforded to students require documentation and review. The Student Accessibility Center will issue accommodation letters for registered students to present to their instructors: accommodations are not active until students present these letters to their instructors. If students’ accommodations involve attendance or deadlines, instructors and students will jointly complete and execute an Agreement Form articulating their terms. See <https://www.luc.edu/sac/faculty/facilitatingaccommodations> for guidance about implementing various kinds of accommodations in a way that is appropriate to your class. The Student Accessibility Center stands ready to work with you.

1.13 Academic Integrity

All students in this course are expected to have read and to abide by the demanding standard of personal honesty, drafted by the College of Arts & Sciences, which can be viewed at:

<https://www.luc.edu/cas/advising/academicintegritystatement>. A basic mission of a university is to search for and to communicate the truth as it is honestly perceived. A genuine learning community cannot exist unless this demanding standard is a fundamental tenet of the intellectual life of the community. Students of Loyola University Chicago are expected to know, to respect, and to practice this standard of personal honesty.

Academic dishonesty can take several forms, including, but not limited to cheating, plagiarism, copying another student’s work, and submitting false documents. Any instance of dishonesty (including those detailed on the website provided above or in this syllabus) will be reported to The Chair of The Department of Chemistry & Biochemistry who will decide what the next steps may be. (please specify what the punishments will be for transgressions).

Balancing AI Assistance and Personal Understanding in our Academic Journey

In accordance with the constructivist epistemology of learning, let’s ensure that we engage actively in the process of learning and collaboratively share optimal methods. It’s important that we do not overly rely on AI to handle the learning on our behalf. Within the framework of this course, it is required that any assignments submitted for evaluation reflect your personal ideas and comprehension of the designated materials.

If you find yourself in a situation where you’re unsure whether your utilization of AI aligns with the standards set by the University or the course itself, I encourage you to reach out to me for a discussion regarding your apprehensions. Constructivist learning emphasizes the active role of the learner in constructing knowledge, and this course aims to promote your individual engagement and understanding of the subject matter.

1.14 Loyola University Absence Policy for Students in Co-Curricular Activities (including ROTC)

Students missing classes while representing Loyola University Chicago in an official capacity (e.g., inter-collegiate athletics, debate team, model government organization) shall be allowed by the faculty member of record to make up any assignments and to receive notes or other written information distributed in the missed classes.

Students should discuss with faculty the potential consequences of missing lectures and the ways in which they can be remedied. Students must provide their instructors with proper documentation i.e., “Athletic Competition & Travel Letter” describing the reason for and date of the absence.

This documentation must be signed by an appropriate faculty or staff member and it must be provided to the professor in the first week of a semester. It is the responsibility of the student to make up any assignments. If the student misses an examination, the instructor is required to allow the student to take the examination at another time (See <https://www.luc.edu/athletheadvising/attendance.shtml>).

Students who will miss class for an academic competition or conference must provide proper documentation to their instructor as early in the semester as possible.

1.15 Accommodations for Religious Reasons

If you have observances of religious holidays that will cause you to miss class or otherwise effect your performance in the class you must alert the instructor *within 10 calendar days of the first class meeting of the semester* to request special accommodations, which will be handled on a case by case basis.

1.16 Privacy Statement

Assuring privacy among faculty and students engaged in online and face-to-face instructional activities helps promote open and robust conversations and mitigates concerns that comments made within the context of the class will be shared beyond the classroom. As such, recordings of instructional activities occurring in online or face-to-face classes may be used solely for internal class purposes by the faculty member and students registered for the course, and only during the period in which the course is offered. Students will be informed of such recordings by a statement in the syllabus for the course in which they will be recorded. Instructors who wish to make subsequent use of recordings that include student activity may do so only with informed written consent of the students involved or if all student activity is removed from the recording. Recordings including student activity that have been initiated by the instructor may be retained by the instructor only for individual use

1.17 LUC Academic Calendar

<https://www.luc.edu/academics/schedules>

1.18 Course Grading

The total grade for the course is based on Attendance and Professionalism, OWL HWs, Group Quizzes, Exams, and Final Exam.

1.18.1 Professionalism (5%)

Attendance will be taken in class meetings and will have 5% weight in the overall course grade. Every meeting has 2 points towards attendance category. Missing a class due to an official excuse will have 1 point attendance grade per class meeting, if the instructor is notified before class meeting on these days.

Definition 1.1 (What is Professionalism?)

In Merriam-Webster, **professionalism** is defined as “the conduct, aims, or qualities that characterize or mark a profession or a professional person.”^a

^aProfessionalism. (2019). In Merriam-Webster.com Dictionary. Retrieved May 27, 2022 from <https://www.merriam-webster.com/dictionary/professionalism>



In the context of CHEM 171-001, professionalism is demonstrated through:

- ① attendance,
- ② punctuality, and
- ③ assignment deadline behavior.

The following excerpt is drawn from a recent study¹ about the effect of professionalism on students' performance in face-to-face, online, and hybrid settings.

Study results indicate that **professionalism grades, in terms of attendance and punctuality, were high (median of 93.33–100%) for students earning 80–100% median final course grades.** Students earning 70–80% mean final course grades were less motivated to earn high professionalism grades— earning a 75.20% mean. There was little difference between final course grades and professionalism grades for students earning less than a 70% median for a final course grade.

Thus, I expect all of my students to attend the course meetings regularly and stay active during lecture. The following scale will be applied to determine the Professionalism grade for this course:

- Professionalism points: 10 points will be assigned to all students at the beginning of Fall 2023. In response to the potential issues revolving around punctuality and assignment deadline behaviors, –2 points will be applied for each occurrence until the maximum of five occurrences is reached.
- Attendance grade is computed based on being present in class and scaled to 10 points.
- Weighing 5% of overall course grade: 50% is designated to Attendance, and 50% is designated to Professionalism.

Example 1.1 Let's say one attended 95% of the class meetings and had one time punctuality issue. Thus:

¹Ulmer, JM. (2020). Professionalism in Engineering Technology: A study of final course grades, student professionalism, attendance, and punctuality. *Journal of Technology Education*, v31(2), 56–68. Retrieved May 27, 2022 from <http://files.eric.ed.gov/fulltext/EJ1254763.pdf>

$$\begin{aligned}\text{Professionalism raw score} &= \frac{50 \times \text{Attendance score}}{100} + \frac{50 \times \text{Professionalism score}}{100} \\ &= \frac{50 \times 9.5}{100} + \frac{50 \times 8}{100} \\ &= 4.75 + 4 \\ &= 8.75 \text{ (out of 10 pts.)}\end{aligned}$$

Then, Professionalism category (i.e. 5% weighted) contribution towards overall course grade is computed as follows:


$$\begin{aligned}\text{Professionalism} &= 5 \times \frac{\text{Professionalism raw score}}{10} \\ &= 5 \times \frac{8.75}{10} \\ &= 4.38 \text{ (out of 5 pts. in overall course grade)}\end{aligned}$$

1.18.2 Cengage OWL HWs (15%)

Cengage OWL is the online homework system we will use in Fall 2023. While being lengthy, this kind of thorough practice is necessary to master the concepts and problem-solving skills in this course.


Considering that majority of exam questions and some other relevant standardized test (e.g. ACS Exam) are multiple-choice in nature, Cengage OWL assignments would prepare you for such measurements. In my experience, there is a high degree of positive correlation between OWL scores and overall course grades. The higher the OWL average, the closer your future overall course grade. If you are not getting good scores from OWL HWs, this is an early signal for you to get alarmed and adjust your learning strategy accordingly.

OWL homework assignments (OWL HWs) can be accessed through the following link: <https://www.cengage.com>. These assignments are due on the Sundays specified in the tentative schedule, with a deadline of 11:55 PM. All OWL HWs will be made available on the first day of the class meeting.

 **Note** One cannot makeup a missed OWL HW. To accommodate such cases, the lowest OWL HW will be dropped.

1.18.3 Group Quizzes (10%)

Weekly, completed in small groups (assigned by instructor). The purpose of working challenging problems as a group is to help you learn via cooperation, communication and support among your classmates as you push the limits of your knowledge. For weekly quizzes you are required to attend your scheduled discussion face-to-face to work with your assigned group. Each group submits one copy of their work at the end of the discussion period. Participating group members will receive Completion credit if the work they submit includes a meaningful attempt at completing all of the problems.

 **Note** One cannot makeup a missed Group Quiz. To accommodate such cases, the lowest Group Quiz will be dropped.

Example 1.2 Here is a sample rubric (per question/part) for assessing the completeness of the Group Quizzes:

- 1 pt.: Attempted with full solution / More than half of the solution
- 0 pt.: Blank / Not justified / Less than half of the solution

1.18.4 Exams (45%)

These exams are comprehensive reviews of the most recent chapters covered, plus whatever other material from earlier in the course is necessary to assess you on those chapters. It will be both multiple choice and free response. The lowest exam will be dropped.

1.18.5 Final Exam (25%)

It's a final. Its like the exams but bigger covering all the content.

The final will be held on:

Thursday, December 14, 2023 at 9:00 – 11:00 AM. Room: Flanner Hall - Room 7

You will have exactly 2 hours to complete the exam. Additional time will not be granted, even if you start late. There will be no make-up final exams given under any circumstance, and the exam will not be given early, either.

Instructors may not reschedule final exams for a class for another day and/or time during the final exam period. There can be no divergence from the posted schedule of dates for final exams. Individual students who have four (4) final examinations scheduled for the same date may request to have one of those exams rescheduled. If you have four final examinations scheduled for the same date, please e-mail a petition to Adam Patricoski, Assistant Dean for Student Academic Affairs, CAS Dean's Office (apatricoski@luc.edu).

1.18.6 Grading Scale

The following scale will be used to determine letter grades.

Category	Lowest Dropped	Weight	Thresholds	Letter Grade
Professionalism	–	5%	100 – 93	A
OWL HWs	1	15%	92 – 89	A–
Group Quizzes	1	10%	88 – 85	B+
Exams	1	45%	84 – 81	B
Final Exam	–	25%	80 – 77	B–
			76 – 73	C+
			72 – 69	C
			68 – 65	C–
			64 – 60	D
			0 – 59	F
Total:		100%		

1.19 COVID Protocols and Assistance

1.19.1 Masking Requirement

You DO NOT need to wear face masks in class unless you feel sick or you prefer otherwise. Here is the quote from the latest university news on this topic:

Effective May 27, University policy will strongly recommend, but no longer require, masks in classrooms or labs on our Chicago campuses. Faculty members, however, may continue to require masks in their classrooms. Please adhere to any specific classroom policy regarding the use of masks in the classroom. Students who are not compliant with specific classroom policies may be subject to discipline including referral to the [Office of Student Conduct & Conflict Resolution \(OSCCR\)](#) for a policy violation.

1.19.2 Absence (Discussion)


Illness based absences must be relayed (emailed) to the instructor by 8:00 AM. The absent member of the group may be accommodated to submit the discussion worksheet by the end of the day *individually*.

1.19.3 Absence (Quizzes/Exams)

The primary mechanism for accommodating illness is the dropped exam/quiz (see Grading Scale above).


1.19.4 Absence (OWL HWs)


OWL HWs are online and no accommodations are needed.

 **Note** Documentation of illnesses is non-negotiable in the instances when it is listed above.

1.20 Tentative Schedule of the Course

An outline of the topics that will be covered in this course appears below. Although I will generally follow the order of presentation found in your textbook, on occasion I will deviate from this order. Please refer to any announcements posted to [Sakai](#).

 **Note** Reading assignments are indicated following the chapter titles in the schedule below. Notation: §1.1-2 means "read chapter 1 sections 1 through 2."

 **Note** "OWLHW" refers to assignments completed on the Cengage OWL website. The due dates are specified in the schedule below, and they must be submitted by 11:55 PM on the corresponding Sundays.

MONDAY	WEDNESDAY	FRIDAY
<div style="border: 1px solid black; display: inline-block; padding: 2px;">Aug 28th</div> 1 Meeting Syllabus Introduction <i>Read: §1.1-6</i>	30th 2 Introduction <i>Read: §1.1-6</i>	<div style="border: 1px solid black; display: inline-block; padding: 2px;">Sep 1st</div> 3 Atoms and Molecules <i>Read: §2.1-8</i> Discussion 1 OWLHW 1
4th Labor Day (No Class)	6th 4 Atoms and Molecules <i>Read: §2.1-8</i>	8th 5 Atoms and Molecules <i>Read: §2.1-8</i> Discussion 2 OWLHW 2

MONDAY	WEDNESDAY	FRIDAY
11th 6 Molecules, Moles, and Chemical Equations <i>Read: §3.1-6</i>	13th 7 Molecules, Moles, and Chemical Equations <i>Read: §3.1-6</i>	15th 8 Molecules, Moles, and Chemical Equations <i>Read: §3.1-6</i> Discussion 3 OWLHW 3
18th 9 Stoichiometry <i>Read: §4.1-6</i>	20th 10 Stoichiometry <i>Read: §4.1-6</i>	22nd 11 Exam 1 [<i>Covering Chapters 1-4</i>] Discussion 4 OWLHW 4
25th 12 Gases <i>Read: §5.1-7</i>	27th 13 Gases <i>Read: §5.1-7</i>	29th 14 Gases <i>Read: §5.1-7</i> Discussion 5 OWLHW 5
Oct 2nd 15 The Periodic Table and Atomic Structure <i>Read: §6.1-8</i>	4th 16 The Periodic Table and Atomic Structure <i>Read: §6.1-8</i>	6th 17 The Periodic Table and Atomic Structure <i>Read: §6.1-8</i> Discussion 6 OWLHW 6
9th Mid-Semester Break (No Class)	11th 18 Chemical Bonding and Molecular Structure <i>Read: §7.1-9</i>	13th 19 Chemical Bonding and Molecular Structure <i>Read: §7.1-9</i> Discussion 7 OWLHW 7
16th 20 Chemical Bonding and Molecular Structure <i>Read: §7.1-9</i>	18th 21 Molecules and Materials <i>Read: §8.1-7</i>	20th 22 Molecules and Materials <i>Read: §8.1-7</i> Discussion 8 OWLHW 8
23rd 23 Molecules and Materials <i>Read: §8.1-7</i>	25th 24 Energy and Chemistry <i>Read: §9.1-8</i>	27th 25 Exam 2 [<i>Covering Chapters 5-8</i>] Discussion 9 OWLHW 9

MONDAY	WEDNESDAY	FRIDAY
30th 26 Energy and Chemistry <i>Read: §9.1-8</i>	Nov 1st 27 Energy and Chemistry <i>Read: §9.1-8</i>	3rd 28 Energy and Chemistry <i>Read: §9.1-8</i> Discussion 10 OWLHW 10
6th 29 Entropy and the Second Law of Thermodynamics <i>Read: §10.1-8</i>	8th 30 Entropy and the Second Law of Thermodynamics <i>Read: §10.1-8</i>	10th 31 Entropy and the Second Law of Thermodynamics <i>Read: §10.1-8</i> Discussion 11 OWLHW 11
13th 32 Chemical Kinetics <i>Read: §11.1-8</i>	15th 33 Chemical Kinetics <i>Read: §11.1-8</i>	17th 34 Chemical Kinetics <i>Read: §11.1-8</i> Discussion 12 OWLHW 12
20th 35 Chemical Equilibrium <i>Read: §12.1-9</i>	22nd Thanksgiving (No Class)	24th Thanksgiving (No Class)
27th 36 Chemical Equilibrium <i>Read: §12.1-9</i>	29th 37 Chemical Equilibrium <i>Read: §12.1-9</i>	Dec 1st 38 Exam 3 [Covering Chapters 9-12] Discussion 13 OWLHW 13
4th 39 Electrochemistry <i>Read: §13.1-8</i>	6th 40 Electrochemistry <i>Read: §13.1-8</i>	8th 41 Electrochemistry <i>Read: §13.1-8</i> Discussion 14 OWLHW 14

 **Note** Final Exam will be held on Thursday, December 14, 2023 at 9:00 – 11:00 AM. Room: Flanner Hall - Room 7.

 **Note** Changes to this syllabus may be made when deemed appropriate.