



CHEM 480: Principles of Teaching & Learning in Chemistry
Spring 2021
Loyola University Chicago

Course Description

This course focuses on aspects specific to the teaching and learning of chemistry at post-secondary levels. Geared towards graduate students, undergraduate seniors, or current educators who plan on instructing college students, it explores principles surrounding how people learn chemistry and how to align pedagogies and environments to optimize learning opportunities for students. Course activities and assignments are designed to initiate the building of an instructional portfolio to prepare enrolled students for potential academic careers.

Course Instructors and Contact Information

Mary van Opstal, Ph.D.
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Office Hours: Arranged individually or in groups to provide feedback or ask questions.

Class Meeting Times and Locations

Online, Mondays and Wednesdays, 6:15 – 7:30 pm Central Time

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 education¹. The study of principles of teaching and learning in 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.

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

¹<http://www.luc.edu/transformatived/>

Accessibility

Loyola University provides reasonable accommodations for students with disabilities. Any student requesting accommodations related to a disability or other condition is required to register with Student Accessibility Center (SAC), located in Sullivan Center, Suite 117. Professors receive the accommodation notification from SAC via Accommodate. If you are requesting accommodations, please set up a meeting with the instructors individually in order to discuss these. All information will remain confidential. Please note that in this class, software may be used to record class lectures in order to provide equal access to students with disabilities. Students approved for this accommodation use recordings for their personal study only and recordings may not be shared with other people or used in any way against the faculty member, other lecturers, or students whose classroom comments are recorded as part of the class activity. Recordings are deleted at the end of the semester. For more information about registering with SAC or questions about accommodations, please contact SAC at 773-508-3700 or SAC@luc.edu

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/>

Course Evaluation

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

Table 1. Grade Criteria

Criteria	Maximum Percent Value
Weekly reflections & activities	20 %
Syllabus	5 %
Unit plan	45 %
Teaching and learning digital portfolio	30 %

Weekly reflections and activities will involve short assignments to foster deeper understanding or to expand resources relevant to course topics.

Building a *Syllabus* will involve creating a syllabus for a hypothetical chemistry course that you might teach in the future.

A *Unit plan* will be created to reflect and integrate course content and principles for teaching chemistry content, moving from learning activities through assessments of learning, both formative and summative. One unit plan will be created and will include reflections on how the learning activities and assessments reflect how students learn and how we know what students know.

Teaching and learning digital portfolio will be a compilation of weekly reflections and activities and involve expansion of course ideas specifically in developing assessments and learning activities for both lecture and lab courses. It will also include your teaching philosophy statement, a reflection statement on what you learned in this course and how it helped you advance toward your goals, and an organized, annotated catalog of resource materials that you think will be helpful to you in teaching undergraduate chemistry. This digital portfolio will continue to be available to you on OneDrive, Google Drive, or another format of your choice as you move from Loyola and begin your academic career. This will provide a starting point for you to continue to build materials for your courses that can be transferred to whatever learning management system is used at your college/university.

Syllabi, unit plans, and digital portfolios will be shared with other students in the class in order to provide each of you with as large a set of resources as possible to begin teaching. If you have any concerns or objections to sharing your materials or a portion of your materials, please discuss this with the course instructors.

Grading: Grades will be assigned according to the grading scale presented below.

B+: <90% - 88%	A: \geq 92%	A-: <92% - 90%
C+: <80% - 78%	B: <88% - 82%	B-: <82% - 80%
D+: <70% - 68%	C: <78% - 72%	C-: <72% - 70%
	D: <68% - 60%	F: <60%

Deadline Policy: Due dates are to help you keep your learning on track and manageable. Missed or late work can affect your learning in the course. If you know you will miss a deadline for an assignment, please email before the deadline of the assignment so that we can discuss if an extension is merited.

Feedback is critical in helping students to learn and in providing them with insights and alternative ways of thinking about material. It can also provide students with a means for improving or refining their following assignments. In this course the instructors will provide feedback on assignments within 7 days and will model types of feedback that you may use when you teach.

Attendance: It is expected that you attend class and contribute to class discussions and work. Attendance is essential for you to succeed in this class. Please let the instructors know if you will miss or be late to class.

Loyola University Absence Policy for Students in Co-Curricular Activities:

Students missing classes while representing Loyola University Chicago in an official capacity (e.g. intercollegiate 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 (develop standard form on web) 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 as far in advance of the absence as possible. It is the responsibility of the student to make up any assignments. If the student misses an examination, the instructor is required to give the student the opportunity to take the examination at another time. (<https://www.luc.edu/athletheadvising/attendance.shtml>)

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 education content and developing thinking skills. This will more often be driven by the use of data and reasoning to discover concepts and solutions rather than the identification and exchange of teaching techniques without context.

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.

Recording of Zoom class meetings

In this class software will be used to record live class discussions. As a student in this class, your participation in live class discussions will be recorded. These recordings will be made available only to students enrolled in the class, to assist those who cannot attend the live session or to serve as a resource for those who would like to review content that was presented. All recordings will become unavailable to students in the class when the course has concluded. The use of all video recordings will be in keeping with the University Privacy Statement shown below.

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.

Table 2. Proposed Guiding Questions, Course Actions, Objectives, and Schedule

Class Dates	Questions, Actions & Objectives
1/20 – 1/25	How do people learn? <ul style="list-style-type: none">● Explore and discuss key principles about the brain and learning as concluded by cognitive science, learning theories, and educational psychology● Analyze plans for teaching a chemistry lesson in light of implications for teaching from principles about learning
1/27 – 2/3	What does it take to learn chemistry? <ul style="list-style-type: none">● Consider common knowledge and skill development necessary to understand some key principles of chemistry● Analyze common preconceptions, conceptions, and misconceptions of chemistry content● Analyze the nature of problem solving in chemistry● Describe and evaluate the use of models to understand chemistry
2/8	How do I find out what students know? (Part 1) <ul style="list-style-type: none">● Consider the nature of asking questions to assess student understanding● Identify and evaluate the utility of formative and summative assessments
2/10	Break
2/15	How do I find out what students know? (Part 2) <ul style="list-style-type: none">● Consider the nature of asking questions to assess student understanding● Identify and evaluate the utility of formative and summative assessments
2/17 – 2/22	How do I build rapport and trust with students? <ul style="list-style-type: none">● Build protocols for setting course expectations, guidelines, and practices● Consider instructional strategies and course activities that are inclusive and accommodating
2/24 – 3/3	What does it take to teach chemistry? (Part 1) <ul style="list-style-type: none">● Describe physical course attributes (e.g. lecture vs. discussion, large enrollment vs small enrollment) and explore the implications for teaching● Investigate and evaluate examples of active learning strategies for teaching
3/8	Break

3/10	<p>What does it take to teach chemistry? (Part 2)</p> <ul style="list-style-type: none"> • Describe physical course attributes (e.g. lecture vs. discussion, large enrollment vs small enrollment) and explore the implications for teaching • Investigate and evaluate examples of active learning strategies for teaching
3/15 – 3/24	<p>How do I teach the difficult content of chemistry?</p> <ul style="list-style-type: none"> • Consider instructional approaches and lesson planning for handling more difficult and abstract chemistry topics, e.g. chemical kinetics and equilibrium and chemical thermodynamics • Explore the benefits and challenges of integrating systems thinking into teaching chemistry • Explore the use of contexts for creating relevancy for learning chemistry content
3/29 – 3/31	<p>What should I do for lab components or courses?</p> <ul style="list-style-type: none"> • Identify essential aspects of laboratory and how to implement them • Explore various pedagogies for the laboratory
4/5 – 4/7	<p>What are the available venues and strategies for teaching chemistry?</p> <ul style="list-style-type: none"> • Engaging and identifying learning about educational technology • Explore impacts of class size and classroom layout
4/12 – 4/14	<p>How do I set up my course and grade students?</p> <ul style="list-style-type: none"> • Consider designs for chemistry courses and how to assess and evaluate students' learning • Develop a syllabus for a chemistry course that one may potentially teach
4/19 – 4/21	<p>What are the resources available to me for professional development in teaching?</p> <ul style="list-style-type: none"> • Explore areas and venues for ongoing professional development in teaching at one's institution, in regional conferences, and in professional societies and national meetings.
4/26 – 4/28	<p>How do I create lessons and unit plans for teaching chemistry?</p> <ul style="list-style-type: none"> • Create a complete unit plan that contains lesson plans and assessments for teaching a specific content area in chemistry.