Illinois State University
Department of Chemistry
CHE 401.01
(previously CHE 380.61)
Advanced Chemistry Demonstrations: Gas Properties, Laws, and Reactions
3 credit hours

Catalog Description:
Advanced Chemistry Demonstrations: Gas Properties, Laws, and Reactions
3 F, S, Sum *CHE 301 or 401 (any other topics) or 402 or 403 or equivalent as prerequisite.* Structured analysis of current best practices in teaching gas properties and reactions as it pertains to secondary school classrooms. A particular emphasis will be to connect content knowledge to modern demonstrations and teaching activities.

Instructor:

Dr. Willy Hunter

Phones: 309 438-3708
Email: wjhunte@ilstu.edu

Materials:

Required: Access to the Canvas Course Website

Required: Advanced Chemistry Demonstrations: Gas Properties, Laws, and Reactions Course Video Website (https://www.flinnsci.com/gas-laws-properties-and-reactions/che401.01/)

Contact Hours:
This course is a structured course available online for 8 *(summer term)* or 16 *(fall/spring term)* weeks from the start date of the course. Each assignment, except the final project, will be available at the start of the course but will have specific deadlines for when they need to be completed.

Accommodations:
Any student needing to arrange a reasonable accommodation for a documented disability should contact Student Access and Accommodation Services at 350 Fell Hall, 309 438-5853 (voice), 309 438-8620 (TTY).

Course Overview and Objectives:
This course constitutes a survey course of ways in which we can understand and teach gas properties and reactions. A particular emphasis will be to connect content knowledge to modern demonstrations and teaching activities. Students will improve their chemistry content knowledge from the resource materials, as well as be expected to search local and internet-based resources for current best practices. Students will be introduced to demonstrations and teaching activities which engage them in a detailed examination of the ways in which current chemistry teachers deliver gas law demonstrations and class activities. Students will be exposed to and expected to master the demonstration activities taught in the course.

This course seeks to provide some answers to the following questions:

1. What is our current best understanding of the nature of gases and gas reactions?
2. What are the safety considerations and risks associated with teaching the gas laws? How may the gas laws be taught safely in schools?
3. What is the role of the National Standards and State Standards in determining how the gas laws are taught in schools?
4. What pedagogical techniques are appropriate for teaching gas laws and properties in secondary schools?
5. What are the challenges associated with teaching the gas laws?

Required Student Tasks/Assignments:

1. Students are expected to discuss relevant pedagogical issues relating to the teaching of gas properties or gas laws. Each discussion will be facilitated and later, summarized by the assigned discussion leader.
2. Students are expected to watch each of the following 13 videos packages. For each video package there are a series of questions that must be answered. Each video package has content and pedagogical questions associated with it. The lowest order (Knowledge and Comprehension) of the content questions are designed to ensure that students watch the video. The medium-order (Analysis and Application) and higher-order (Synthesis and Evaluation) questions may require the use of outside resources to generate correct answers. The lowest order (Knowledge and Comprehension) of the pedagogical questions are designed to ensure that students watch the video. The medium-order (Analysis and Application) and higher-order (Synthesis and Evaluation) questions may require the use of outside resources to generate correct answers or to consider the use of activity in their own classroom to determine the correct answer. Additionally, there are questions that link the episodes in each video package to the National Science Education Standards.
3. Students will complete a comprehensive curriculum project in which they reflect on their current curriculum, draft a change to their current gas laws curriculum, and then revise their curriculum given peer review feedback.

Grading Scale

Grades in the course are based upon timely completion of each assessment.

90% – 100% = A
80% – 89% = B
70% – 79% = C
60% – 69% = D
0% – 59% = F

The point breakdown for the course is as follows:

Video assessments:	110 points
Discussions:	80 points
Discussion Leader Summary:	20 points
Final Project:	150 points
Total Points:	360 points

Assessment Schedule (Summer 2025)

All assignments are due at midnight central time on the following days unless otherwise specified within the course calendar in Canvas.

Due Date:		Assignment:
June	16	Disc 1 Posts; **Reflection**; Quiz 1
	20	Disc 1 Responses
	23	Disc 2 Posts; Quiz 2
	27	*Disc 1 Leader Summary*; Disc 2 Responses
	30	Quiz 3; Quiz 4
July	07	*Disc 2 Leader Summary*; Disc 3 Posts
	11	Disc 3 Responses
	14	Disc 4 Posts; Quiz 5
	18	*Disc 3 Leader Summary*; Disc 4 Responses
	21	**Draft Curriculum Project**; Quiz 6
	25	**Curriculum Project Peer Reviews**; *Disc 4 Leader Summary*
Aug	01	**Final Curriculum Project**