

**Center for Talent Development
Northwestern University
Course Syllabus**

Gifted LearningLinks Program

Course Title: Chemistry

Course Description:

Learning Links Chemistry Honors is an introductory course covering topics equivalent to a full year of high school chemistry at the honors level. The content within Chemistry Honors is organized into five units:

- Unit One: Introductory Concepts in Chemistry (5 chapters, 6 labs, unit exam)
- Unit Two: Chemical Compositions and Reactions (5 chapters, 4 labs, unit exam)
- Unit Three: Energy and Bonding (3 chapters, 4 labs, unit exam)
- Unit Four: States of Matter, Reactions and Electrochemistry (6 chapters, 7 labs, unit exam)
- Unit Five: Advanced Chemistry Applications (3 chapters, 4 labs, no unit exam)

The laboratory exercises both reinforce and elaborate on key topics and require simple household/scientific supplies for completion.

Outcomes: Upon successful completion of this course, students will be able to:

- solve quantitative chemistry problems and demonstrate reasoning clearly and completely.
- integrate multiple ideas in the problem solving process, and check their results to make sure they are physically reasonable.
- employ critical thinking and hypothesis-driven methods of scientific inquiry.
- clearly explain qualitative chemical concepts and trends.
- describe, explain, and model chemical and physical processes at the molecular level in order to explain macroscopic properties.
- perform basic laboratory techniques correctly using appropriate safety procedures.
- analyze the results of simple laboratory experiments, evaluate sources of error, synthesize this information, and express it clearly in written laboratory reports.
- develop effective written and oral communication skills, especially the ability to transmit complex technical information in a clear and concise manner.
- work collaboratively in teams through online discussion boards and virtual meetings.

Resources and Materials:

- World of Chemistry by Zumdahl, Zumdahl, and DeCoste, Houghton Mifflin Co., 2002. ISBN: 0618134964
- Supplemental labs and activities –found on blackboard site

- Online Lab Experiments through www.latenitelabs.com - user id/pin sent by instructor
- Students will need a scientific calculator and some basic chemistry lab supplies (beakers, graduated cylinders, etc.) Many supplies can be substituted for, but it is recommended that students take inventory and look through the experiments early in the course to determine what is needed for purchase.

Schedule:

SEMESTER ONE				
	Topic/Focus	Activities & Reading Assignments	What do I need to post to the Discussion Board?	What do I need to turn in?
Week 1	Orientation to Online Learning			
Week 2	Introduction to Chemistry	Read Chapter 1 (pp.2-17)	Data/Observations from lab (pg.17)	1) Questions and Problems (p.18-19) #1-16 2) Submit Data/Observations(part I-III) and Analysis and Conclusions (1-5) for lab.
Week 3	Matter	Chapter 2: (pg. 20-41)	Data/Observations from lab (found on Blackboard)	1) Questions and Problems (pg. 44-45) #1,3,5,7,10,11,12,13,16,18,21,23,25 2) Lab 5: Household Chemistry. Submit all necessary work.
Week 4				
Week 5	Chemical Foundations	Chapter 3: (pg. 46-78)		1) Questions and Problems (pg. 80-83) # 1,3,5,7,10,12,14,16,17,19,21,25,30,31,33,35,37,38,41,43,45,49,50 2) Perform "Law of Definite Proportions" Lab through www.latenitelabs.com
Week 6				
Week 7	Nomenclature	Chapter 4		1) Questions and Problems (p. 108-109) # 1-29(odds only), 31,32,39,44,48,51. 2) Grocery Store Nomenclature Lab (p. 107) I will email you your clues when you are ready – just let me know
Week 8				

Week 9	Measurements and Calculations	Chapter 5	First Draft of Essay (See Blackboard for details)	<p>1) Questions and Problems #1-73 (odds only)</p> <p>2) Chemistry in Action – The Density of Clay (p. 143) – be sure to answer ALL questions in this activity and submit them with your data.</p> <p>3) Perform: Ch. 5 lab (posted on blackboard site)</p> <p>4) Submit: all data tables and questions for the lab.</p> <p>5) Take Exam #1</p>
Week 10				
Week 11	Chemical Composition	Chapter 6		<p>1) Perform: Chemistry in Action (p. 170) – if you do not have rubber stoppers, use something similar in mass. Please download simulation from Blackboard for class data.</p> <p>2) Submit: Data table and answers to all questions for Chem in Action activity.</p> <p>3) Submit: Questions and Problems (p. 187-190) #1-50 (odds only) 54,56,58,59,65</p> <p>4) Perform: The Bean Lab (posted on blackboard site)</p> <p>5) Submit: all data and questions for the bean lab</p>
Week 12				
Week 13	Chemical Reactions	Chapter 7		<p>1) Questions and Problems # 1-36,38,40,42,45,46</p> <p>2) Perform: "Chemical Reaction Types and their Equations" Lab through www.latenitelabs.com - Ask Mr. Chan for user id/pin</p>
Week 14				
Week 15	Reactions in Aqueous Solutions	Chapter 8		<p>1) Perform: "Qualitative Analysis - Group I Cations" Lab through www.latenitelabs.com - Ask Mr. Chan for user id/pin</p> <p>2) Submit: Questions and Problems (p. 245-249) # 1-39</p>

Week 16				
Week 17	Chemical Quantities	Chapter 9		1) Perform: Chemistry in Action (p. 254) – use at least 15 nuts and 10 bolts 2) Submit: all questions and equations for Chem. In Action activity 3) Submit: Questions and Problems # 1-61 (odds only) 4) Take Exam #2
Week 18				
SEMESTER TWO				
	Topic/Focus	Activities & Reading Assignments	What do I need to post to the Discussion Board?	What do I need to turn in?
Week 19	Energy	Chapter 10		1) Perform: Lab – Energy Value of Nuts (posted on blackboard) 2) Submit: all pre-lab questions, analysis and conclusions and “something extra” questions from the lab. 3) Submit: Questions and Problems (p. 318-321)- all even # questions (2-64)
Week 20				
Week 21	Modern Atomic Theory	Chapter 11		1) Submit: Questions and Problems (p. 354-357) #1-57(odd #'s only) #70,71,72,74 2) Perform: Electron Probability Lab (p. 353 in textbook) 3) Submit: Data/Observations, Analysis and Conclusions, and Something Extra for lab.
Week 22				
Week 23	Chemical Bonding	Chapter 12	Post 2nd draft of Essay	1) Perform: Chemistry In Action – Geometric Balloons p. 385 2) Submit: #5,6,7 from C.I.A. activity

				<p>3) Perform: Models of Molecules lab (p. 393)</p> <p>4) Submit: Prelab Assignment, Analysis and Conclusions and Summary Table from lab.</p> <p>5) Submit: Questions and Problems (p. 394-397) odds #1-52</p> <p>6) Take Exam #3</p>
Week 24				
Week 25	Gases	Chapter 13		<p>1) Submit: Questions and Problems p. 435-438 (Odds # 1-53)</p> <p>2) Perform: Gas Laws and Drinking Straws lab (p. 434)</p> <p>*For a preform, you can substitute any rigid container with a relatively small mouth that can be sealed around a drinking straw.</p> <p>3) Submit: Data/Observations and Analysis and Conclusions from lab.</p>
Week 26	Liquids and Solids	Chapter 14		<p>1) Perform: Heat of Fusion of Ice lab (p. 462)</p> <p>2) Submit: Pre-lab assignment, Data/Observations and Analysis and Conclusions</p> <p>3) Submit: Questions and Problems (p. 463-465) odds #1-41, incl. "What if?"p.453</p>
Week 27	Solutions	Chapter 15		<p>1) Perform: "The Temperature Dependence on Salt Solubility" Lab through www.latenitelabs.com - Ask Mr. Chan for user id/pin</p> <p>2) Submit: Questions and Problems (p. 499-501) evens #2-50</p>
Week 28				
Week 29	Acids and Bases	Chapter 16		<p>1) Submit: Questions and Problems #1-50 ALL</p> <p>2) Perform: "Titration Tutorial" and "Titration of Strong and Weak Acids" Lab through www.latenitelabs.com - Ask Mr. Chan for user id/pin</p>
Week 30				
Week 31	Equilibrium	Chapter 17		<p>1) Perform: Chem in Action – Reaching Equilibrium – Are We There Yet? (p. 547)</p>

				<p>2) Submit: #6,7,8 from C.I.A.</p> <p>3) Perform: Equilibrium Beads lab (p. 568)</p> <p>4) Submit: Prelab assignment, Data/Observations and Analysis and Conclusions</p> <p>5) Submit: Questions and Problems (p. 570-572) Odds #1-53</p>
Week 32	Oxidation-Reduction Reactions	Chapter 18		<p>1) Submit: Questions and Problems (p. 602-604) #1-42 ALL</p> <p>2) Perform: "Activity Series of Metals" Lab through www.latenitelabs.com - Ask Mr. Chan for user id/pin</p> <p>3) Take Exam #4</p>
Week 33	Radioactivity and Nuclear Chemistry	Chapter 19		<p>1) Perform: The Half-Life of Pennies lab (p. 628)</p> <p>2) Submit: Prelab Assignment, Data/Observations and Analysis and Conclusion</p> <p>Please download simulation from Blackboard for class data.</p> <p>3) Submit: Questions and Problems (p. 629-631) Odds # 1-51</p>
Week 34			Submit Final Draft of Essay	
Week 35	Organic Chemistry	Chapter 20		<p>1) Perform: Gluep lab (p. 675)</p> <p>2) Submit: Data/Observations and Analysis and Conclusions</p> <p>3) Submit: Questions and Problems p. 677-680 (Evens #2-58)</p>
Week 36	Biochemistry	Chapter 21		<p>1) Perform: Chem. In Action – Colorful Milk (p. 702)</p> <p>2) Submit: #4, 6,7,8 of Chem In Action</p> <p>3) Perform: Enzymes in Food lab (p. 708)</p> <p>4) Submit: Prelab Assignment, Data/Observations, Analysis and Conclusions</p> <p>5) Submit: Questions and Problems (p. 710-711) Odds # 1-41</p> <p>6) Take Final Exam</p>

Student Evaluation and Grading Policies for Credit Courses Only:

A+ 97-100	B+ 87-89	C+ 77-79	D+ 67-69	F Below 60
A 93-96	B 83-86	C 73-76	D 63-66	
A- 90-92	B- 80-82	C- 70-72	D- 60-62	

- Chapter Sets = 30% of the final grade.
 - A chapter set includes all questions assigned from each chapter.
 - Only assignments that are **typed and carefully proof read** will be accepted.
- Unit Exams = 40% of the final grade.
 - A comprehensive exam will be administered when students have completed all of the chapter sets for a given unit.
 - Exams will consist mostly of short essay questions and problem solving.
 - Exams are open-book/open-note unless otherwise indicated and are due one week after receipt.
- Lab Reports = 20% of the final grade.
 - A completed lab assignment is generally required from each chapter.
 - Only assignments that are **typed and carefully proof read** will be accepted.
- Contest Essay = 10% of the final grade.
 - A completed contest essay in one of a handful of science competitions..
 - A draft of your essay should be submitted after 3 months, 6 months, and your final draft is due at the end of the course.

Instructor Biography:

David Chan currently teaches Chemistry at Evanston Township High School in Evanston, Illinois. He taught Chemistry, Physics, Algebra, and Geometry for five years at Roycemore School, also in Evanston, Illinois. Mr. Chan holds a Bachelor of Arts Degree in Chemistry from Northwestern University and a Master of Arts in Teaching from National-Louis University. When he's not in the Chemistry lab, Mr. Chan can be found on the basketball court as an assistant coach for the ETHS Girls' Varsity team, behind his computer as an instructor with CTD's Learning Links program, or on the couch watching his beloved Cubs struggle through yet another losing season. Mr. Chan has been involved with CTD since 2002, and this is his third full year with Learning Links.

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